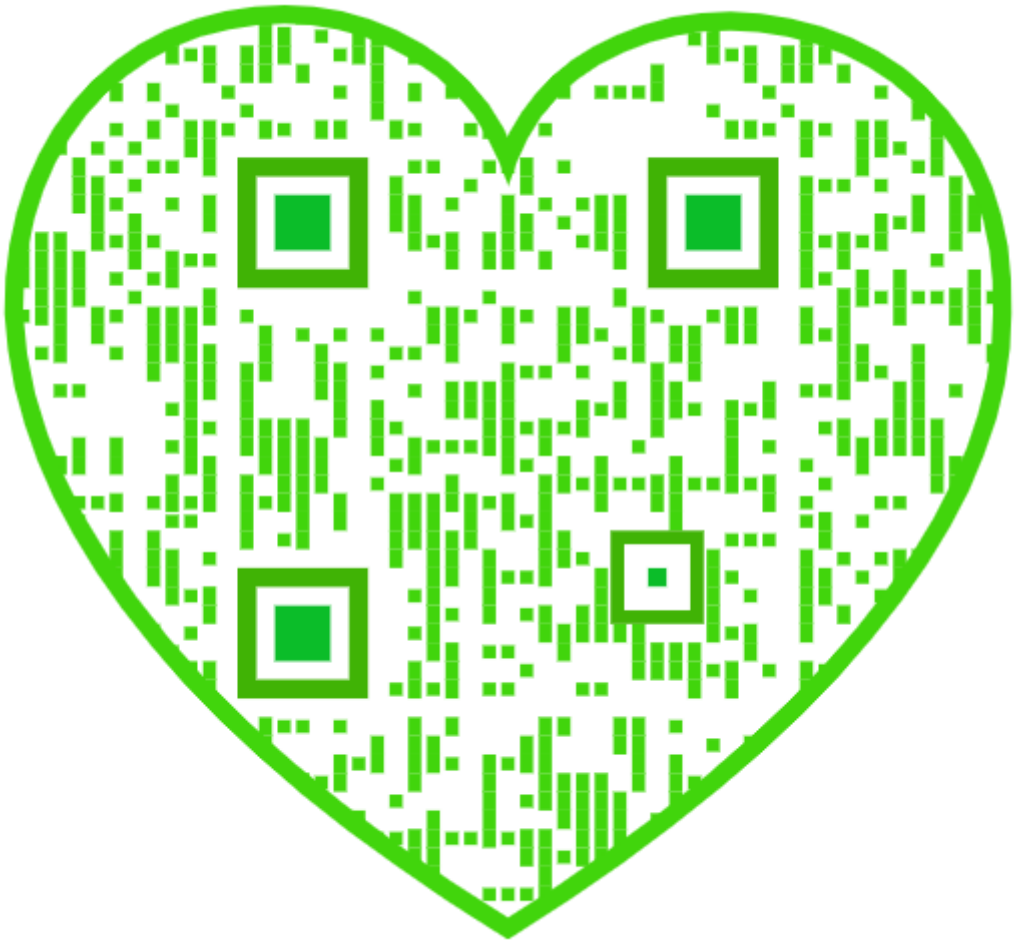
$B 271 280



AMERICAN

GRAPE GROWING

AND

WINE MAKING.

BY

GEORGE HUSMANN,

OF TALCOA VINEYARDS, NAPA, CAL.

NEW AND ENLARGED EDITION.

WITH SEVERAL ADDED CHAPTERS ON THE GRAPE INDUSTRIES OF CALIFORNIA.

ILLUSTRATED.

NEW YORK:
ORANGE JUDD COMPANY,
751 BROADWAY.
1883.

HS

Entered, according to Act of Congress, in the year 1883, by the
ORANGE JUDD COMPANY,
In the Office of the Librarian of Congress, at Washington.
19990

PREFACE TO THE NEW AND ENLARGED EDITION.

The progress of horticulture is so marked and rapid, that those who do not keep even pace with it, are soon left behind. This is especially true with grape culture, which has perhaps progressed more rapidly than any other branch. When I look over the first edition, issued only a few years ago, I find that it has already fallen behind, although its aim was to present the most recent experience. New varieties of grapes have since made their appearance, while old ones have been dropped from the lists, the taste of the public having become more refined and critical. New areas have been opened to grape culture, which is spreading into every State and Territory, from the Atlantic to the Pacific, and the all-important question, one that is asked every day, in every locality, is: "What grapes shall we plant?" This is as it should be; progress is the watchword of the age, and no one can be more willing to acknowledge its claims than I, who have wished for it and believed that it would come, when others thought that these hopes were but the dreams of an enthusiast.

Especially since my removal to the Pacific Coast (in the fall of 1881) have I become aware that a book which I aimed to make as cosmopolitan as possible, in the experience it sought to impart, can not claim to be a guide unless a large share of its pages are devoted to grape culture and wine making in California. A visit to this shore, in the summer of 1881, convinced me that this was the true home of the grape, and that California, with her sunny and dry summers, and her mild winters, was destined to be the vine land of the world; that promised land where every one "could sit under his own vine and fig tree." Diseases of the vine are here comparatively

unknown, the rainless summers, when no showers are expected from May until September, allow nearly all of the crop to ripen every year. Even in the unusually cool summer of 1882, with early and abundant rains in September, the crops ripened sufficiently to make a fair wine, perhaps only the more agreeable because not too heavy. These favorable climatic conditions simplify the culture and training of the vine, the gathering of the fruit, and the operations in wine making. Gallizing and Petiolizing became superfluous, and would not even pay, as grape juice is cheaper than sugar and water would be. In this climate it becomes possible that one man can own and superintend hundreds of acres of vineyard, and that a fair wholesale price for the wine, when three months old, is from twenty to thirty cents per gallon. At this rate it pays the producer well, as it costs him on the average about twenty dollars per annum per acre to cultivate the grapes and make the wine; and five hundred gallons per acre is considered an average yield. That, under all these favorable circumstances, California must become the first grape-growing State in the Union, seems to be but natural, especially when we consider also the raisin industry, perhaps still more profitable, and the extended shipments of table grapes to the Eastern States, and other sources of profit.

But, easy as are grape culture and wine making here, there is a vast field for improvement; and nowhere else perhaps are rational knowledge and proper skill more needed. The very ease of the pursuit, which allowed any one, even with the simplest culture and the most common treatment, to raise a fair crop and make a drinkable wine, has led many, in fact a large majority, to embark in grape growing who knew but little about it, and did not try to learn more. They followed the pursuit negligently and mechanically, without proper study and observation. The results were, the culture of varieties

which produced the most, without regard to quality, and a great amount of inferior wines were made from them. These poor wines, of course, obscured the merits of the really fine wines, and brought them into bad repute. For a number of years California wines were almost unsalable, even at twelve or fifteen cents per gallon.

But this state of affairs has changed for the better, and the improvement still continues. The old Mission grape, which was almost the only variety cultivated at first, and which gives a very heady and heavy wine, but of little fineness and delicacy, is generally cast aside for better varieties, of which nearly all the new plantings have been made. Wines are now beginning to be appreciated according to their merits, the habits of the choicer varieties of the grape are studied more, and their pruning and treatment changed accordingly. Dealers begin to discriminate in their purchases between cellars filled with ordinary wines and those of superior grades; they pay higher prices for the latter, and are reluctant to purchase the former at any price. That this change is as inevitable as it is desirable, must become clear to every one whose judgment is unbiased. It is the "old, old story," which repeats itself in every branch of industry, that only those whose motto is, "Excelsior," who work with brain as well as hand to achieve the best, will eventually win the day. California has wines already, which can take their place with the choicest productions of the Rhine, France, and Burgundy, and we may safely claim for our wines, that a better article can be bought in San Francisco to-day, from some of our leading firms, at from six to nine dollars per case, than can be purchased in St. Louis or New York, of foreign importation, at from fifteen to twenty-four dollars per case. That these wines are often shipped to the East in bulk, and then sold under French and German labels, detracts nothing from their merits; that this is even done in San Francisco, is indeed to be deplored. But

this will change; I hope to yet see the day in which California may proudly claim a place in the front rank in the production of fine wines, and when they will boldly sail under their true colors.

To accomplish this change, we need a closer study of the best varieties for each location, and rational treatment according to their habits; we need more skill in the making and handling of wines; more especially do we require a free and unshakled expression and interchange of experience and opinions among grape growers. The State Viticultural Commission, created by act of Legislature approved in April, 1880, with an annual appropriation of ten thousand dollars, have done a great deal to spread information, and to gather it. The first Convention of grape growers, held in Dashaway Hall, San Francisco, in September, 1882, brought together perhaps the largest and finest exhibition of grapes and wines ever held in the State, and elicited much valuable information. But unfortunately it was also characterized by a dictatorial and arbitrary spirit, which did not allow as free and liberal an interchange of experience as could be wished, and a great deal of time was consumed in learned essays and impracticable theories, which could have been more profitably devoted to experience from practical men, who were in a measure shut out from the discussions, if their views did not happen to coincide with those of the ruling spirits. Let us hope that a more liberal spirit may prevail in the future, and that the next convention will give us a full and free expression of the views of all practical men.

We need close attention to insect pests, and especially to the Phylloxera, which has already made serious inroads in many sections of the State, and may become as destructive to our vineyards in the near future, as it has already been in France. We want to prevent its ravages, not by costly insecticides, or by quarantine, but by the only rational method, the planting of vines able to resist

it; this will establish our vineyards on a permanent basis.

To do my share in this great work, to contribute my mite to the fund of general knowledge, has been the aim of the additional pages, devoted mainly to grape culture and wine making on the Pacific Coast. It is true that my experience here is but limited, but I have observed closely, and have quoted the experience of others wherever I could obtain it. I do not claim to be an authority, nor do I acknowledge any. We are all workers in a common cause, liable to err, but also gathering experience as we labor, which may be of service to others, if imparted. Let me hope, that my brother vintners will receive this new edition as kindly as the former one.

In this, as in the first edition, it has been my object to be a guide to the beginner, the small producer and wine maker, rather than to those who already own establishments large enough to employ skilled labor, and who, with large capital, are able to bear reverses and mistakes with equanimity. But the beginner who works from hand to mouth, who must struggle on for several years before he can realize enough to make a comfortable living, can not afford to make serious mistakes, either in the varieties he plants, or in the wines he makes from them. If such find anything in the pages of this little book which is useful to them, which will cheer their labors and further them, making them more easy and profitable, I shall have attained my object in revising it. What we all need, is practical and useful information, more than elaborate, impractical theories. This I have tried to give, based upon my own experience, and that of other practical vintners from whom I have been anxious to learn, fully realizing that I was entering upon a new field, where I had to learn from those who preceded me.

GEORGE HUSMANN.

Talcoa Vineyards, Napa, Cal.; Nov. 9, 1883.

CONTENTS.

		Page.
Introduction		v
Chapter	I.—The Classification of Grapes	11
"	II.—Propagation of the Vine—By Seeds	16
"	III.—Propagation by Cuttings in the Open Air	19
"	IV.—Propagating the Vine by Layers	21
"	V.—Grafting the Vine	22
"	VI.—The Vineyard—Location, Aspect, and Soil	28
"	VII.—Preparing the Soil	30
"	VIII.—What Grapes to Plant—Choice of Varieties	31
"	IX.—Labrusca Class, With their Hybrids	35
"	X.—The Æstivalis Class—For General Cultivation	54
"	XI.—The Æstivalis Class—Varieties Promising Well	61
"	XII.—Cordifolia Class (or *riparia* according to Engelmann)	65
"	XIII.—The Cordifolia Class—Varieties Promising Well	70
"	XIV.—Varieties Difficult to Classify, etc	77
"	XV.—Varieties for Different Localities	79
"	XVI.—Planting the Vine	81
"	XVII.—Treatment of the Vine the First Summer	84
"	XVIII.—Treatment of the Vine the Second Summer	87
"	XIX.—Treatment of the Vine the Third Summer	91
"	XX.—Treatment of the Vine the Fourth Summer	96
"	XXI.—Training the Vine on Arbors and Walls	98
"	XXII.—Other Methods of Training	99
"	XXIII.—Diseases of the Vine	102
"	XXIV.—Insects Injurious to the Grape	105
"	XXV.—Frosts—Winter Protection	115
"	XXVI.—Girdling, Thinning, and Miscellaneous Matters	117
"	XXVII.—Gathering and Marketing the Fruit	121
"	XXVIII.—Grape Growing in Southern Ohio	127
"	XXIX.—Grape Culture and Wine Making in Ohio	135
"	XXX.—Grape Culture at Kelley's Island, Ohio	138
"	XXXI.—Grape Growing, etc., on Lake Keuka, N. Y	142
"	XXXII.—Grape Growing in Southern Texas	145
"	XXXIII.—The Grapes of Southern Texas	151
"	XXXIV.—The Vineyard in Texas	154
"	XXXV.—Grape-Growing in Western Texas	159
"	XXXVI.—The Culture of the Grape in California	162
"	XXXVII.—Viticulture in Sonoma Valley, California	166
"	XXXVIII.—Viticulture in Napa Co., California	169
"	XXXIX.—Grape Culture in Maryland—Cashin's Trellises	174
"	XL.—Grape Culture in Missouri	180
"	XLI.—Grape Culture Near Chattanooga, Tennessee	182
"	XLII.—White Elk Vineyards, Iowa	184
"	XLIII.—The Phylloxera Problem	186
"	XLIV.—Egg Harbor Wines.—Early Winter Grape.—Cost of a Vineyard	190
"	XLV.—Wine Making	195
"	XLVI.—Dr. Gall's and Petiol's Methods of Wine Making	213
"	XLVII.—Wine Making Rendered Easy—Conclusion	236
	—Grapes and Wine in California	240

PART I.

THE CULTURE OF AMERICAN GRAPES AND VARIETIES.

REESE LIBRARY
OF THE
UNIVERSITY

REESE
UNIVERSITY
CALIFORNIA

CHAPTER I.

THE CLASSIFICATION OF GRAPES.

It is only within comparatively few years that much attention has been given to the parentage of our cultivated varieties of native grapes, as it was formerly thought to be of little or no importance whether a variety was derived from one or another of the few native species. More recent experience has shown that the varieties of a species, however widely they may differ from one another in some respects, agree in other points, and however far the varieties may be removed from the native type, they retain certain characters which indicate a common parentage. On the other hand, if we know from which species a variety is derived, we can, with a fair degree of certainty, predict its general behavior in cultivation, and in a great degree its value. This is so generally true that the experienced viticulturists of the present day regard the origin or parentage of the cultivated varieties as a matter of the first importance. It is not in the character of the fruit alone that our varieties differ, as they are derived from one or another of the native species, but the foliage, the wood, the tendrils, the roots, and other parts of the vine retain their peculiarities; and hardiness not only as regards the ability to endure cold uninjured, but the ability to resist the attacks of both parasitic plants and insects, or whatever else affects the health of the plant is now known to be transmitted with as much certainty, if not, indeed, more surely, than are the form and quality of the fruit.

In classifying the numerous varieties now on the lists, they are grouped according to the species of *Vitis* (the

botanical name of the grape genus), from which they are known to be, or supposed to be, derived, and the name of the species is given to the class. Thus, when a variety is spoken of as "belonging to the *æstivalis* class," it is to be understood that it descended from, or is derived from, the native species of grape called by botanists, *Vitis æstivalis*. So, when in speaking of a variety we, for the sake of brevity, say "it is an *æstivalis*," it is equivalent to saying that it belongs to the class of varieties derived from the species of that name.

All of the European grapes are regarded as having their origin in *Vitis vinifera* of the old world, a species which, though it has been cultivated from the earliest recorded time, is nowhere known in the wild state. The varieties of this, while generally unsuccessful east of the Rocky Mountains, succeed admirably in the climate of the Pacific Coast, and, until very recently, have been cultivated there to the exclusion of all others. It is of interest to our grape-growers principally on account of the hybrids which have been produced between it and our own native grapes. The varieties of the European grape differ from ours in their leaves, which are "smoothish," and, when young, shining; they are more or less deeply 5 to 7-lobed, the lobes pointed and sharply toothed; the flesh of the berry adheres to the skin, while the seeds have a narrow and usually proportionately longer beak than in any of the native varieties.

There are throughout North America, eight or nine species admitted by botanists as distinct, four only of which have yielded varieties of cultivation; these are:

1. *Vitis Labrusca*, The Northern Fox Grape.
2. *Vitis æstivalis*, The Summer Grape.
3. *Vitis cordifolia*, or *V. riparia*, } The Winter or Frost Grape, or The Riverside Grape.
4. *Vitis vulpina*, The Southern Fox Grape.

Without attempting elaborate botanical descriptions, we give here a few brief popular notes on each species; the varieties derived from them will be found grouped together in their proper places. It may be remarked here that the species vary to a great extent in their wild condition, and it is often the case that those most familiar with grapes find it very difficult to decide to which species to refer a given specimen. That most thorough botanist and keen observer, Doct. George Engelmann, of St. Louis, Mo., found that the seeds give, in most cases, more constant marks by which to distinguish the species, than could be found elsewhere. Those who are interested in the botanical aspects of grape culture are referred to an illustrated article prepared by him for the "Bushberg Catalogue," published by Bush & Son & Meissner, Bushberg, Mo.

1. VITIS LABRUSCA, Linn.—The specific name, *Labrusca*, is the ancient Latin one for a wild vine. This species, the well known Wild, or Fox Grape, extends from Canada to the Gulf, but is rarely found in the Valley of the Mississippi. It is common in moist woods or thickets, and sometimes reaches the tops of the highest trees. The leaves are large and thick, often entire, and coated on the underside with a thick, whitish, or rusty wool; berries large, dark-purple, or amber-colored, with a tough pulp and a strong, "foxy," or musky odor; the most common grape of the Northern woods, and presents a great variety in the wild state; has given rise to an important series of table grapes, of which the best known are the Concord, and several useful hybrids.

2. VITIS ÆSTIVALIS, Michaux.—The term Summer Grape is the equivalent of the specific name. This has large leaves, which are clothed on the underside with loose cottony or woolly down, which is bright red or rusty, "smoothish" when old; the clusters slender, com-

pact, dark-blue or black, with a bloom. It is the latest flowering of all the Northern species; its range is more Southern and Western than the preceding, and it reaches great perfection in Missouri, Kansas, Arkansas, and Indian Territory. Norton's Virginia and Herbemont are prominent among the varieties, as will be seen at the proper place, in the "*æstivalis* class."

3. VITIS CORDIFOLIA, Michaux; and VITIS RIPARIA, Michaux.—Michaux described two species of the Winter or Frost Grape, one as *V. cordifolia* (the heart-shaped leaved), and the other as *V. riparia* (of the river banks). The two were kept distinct by Torrey & Gray in the "Flora of North America" (1838). In the "Flora of the State of New York" (1843), Doct. Torrey gives both species, and says of *V. riparia:* "This species is most readily distinguished from the preceding (*V. cordifolia*), with which it is often confounded, by its incisely serrate leaves." Doct. Gray in his "Manual of the Botany of the Northern States" (1856), unites the two under *V. cordifolia,* Michaux, and says: "Var. *riparia* has the leaves broader and cut-lobed." (*V. riparia,* Michx). Doct. Chapman in his "Flora of the Southern U. S." (1860), follows the same arrangement as Gray. Later, Doct. Engelmann in Riley's "Report on the Insects of Missouri" (1874), and in the "Bushberg Catalogue," again restores Michaux's arrangement, and gives both *Vitis cordifolia* and *V. riparia.* Those who are aware of the acuteness he brings to the investigation of obscure subjects, and the high esteem in which he is held in the botanical world, will attach great importance to Doct. Engelmann's views.

According to him, besides the difference in the leaves, the fruit of *V. cordifolia* is black, without a bloom, ripens late, and has a "strong and very fetid aromatic taste, which unfits it for making into preserves, or for pressing wine." In *V. riparia* he says that the berries are usually

larger than in the last, mostly with a bloom, ripens much earlier, and is much pleasanter. While no cultivated varieties of *V. cordifolia* are known, *V. riparia* gives several, the best known of which is Clinton. In a strict botanical classification it might be necessary to keep these two species distinct, but in a viticultural arrangement, where the *cordifolia* class has become established by usage, it seems hardly worth while to insist upon calling it the "*riparia* class." As the *V. cordifolia*, as understood by Engelmann, affords no cultivated varieties, no confusion is likely to result from the use of the term *cordifolia*, to designate that class of grapes of which the Clinton and Taylor are best known, and which the Elvira promises to bring into greater prominence than it has heretofore enjoyed. The remaining species:

4. VITIS VULPINA, Linnæus ("the foxy"), has been called *V. rotundifolia* (the "round-leaved") by some later authors. It is not found north of Maryland, and extends into Florida. It rambles to a great distance, has a close, smooth bark like a beech tree, heart-shaped leaves, shining on both surfaces; the berries, one-half to three-fourths inch in diameter, are very few in a cluster, dropping as soon as ripe, bluish-black (with light-colored varieties), with a very thick and leathery skin and a strong and peculiar flavor. This is the parent of the much talked of Scuppernong, Mish, and others. It is called Bullace, and also Muscadine.

The important hybrids are mentioned under the class to which the native parent belongs. The term hybrid is properly used only where the variety results from the union of two other varieties from distinct species; the Catawba and Clinton, or the Concord and Black Prince, by their union, would in each case produce a hybrid; an Ives fertilized by the pollen of Martha, would produce, not a true hybrid, but merely a cross, as both varieties belong to the same species, the *Labrusca*.

CHAPTER II.

PROPAGATION OF THE VINES.—BY SEEDS.

While the raising of grape vines from the seed is more a labor of love, than of actual profit, yet its influence on grape culture generally has been so great, and we are already indebted so largely to its zealous followers, that it cannot be entirely omitted in a work like this. We can not gain further perfection in varieties without this, and the success which has already attended the labors of Rogers, Wylie, Campbell, Ricketts, Muench, Miller, Weydemeier, Langendoerfer, and especially Mr. Jacob Rommel, in giving to us the Elvira, and other varieties still more promising, affords hopes of even more important results.

To begin then at the beginning: choose your seed from a good stock. I am inclined to believe that only the *æstivalis* and *cordifolia* (or *riparia*, as Engelmann has it) species will give us the true wine grapes of the country, and if we can increase their size somewhat, they will also be the best table grapes. We have them already as large as the Catawba, and they are more juicy, of finer flavor, and less pulpy than the varieties from the *Labrusca* species, while they are much more healthy and hardy. Remember that we have already too many varieties, and that every new one we add should have some decided merit over any of the old varieties, or else be discarded at once.

Choose the best berries and the most perfect bunches, from which to take the seed, and either sow in autumn, and cover, or keep them over winter, mixing the seeds with moist sand, when separated from the pulp, to insure ready germination. Sow early in spring, in well pulverized clay soil, in drills one foot apart, and drop the seeds

about an inch apart in the rows, covering about three-quarters of an inch deep, with finely pulverized soil. When the young plants appear, keep them clean and well cultivated through the summer; in the fall take them up carefully, and put in well drained fine soil, so as to preserve their roots in the most perfect condition. It will be well, during the summer, to look over them frequently, and if any of them show disease in the leaf, pull them up at once, as it is useless to save such as are feeble and unhealthy. It may also be well to shade the young vines for the first month or so, to prevent the sun from scalding them while yet young and tender, and if any of them grow remarkably strong, give them small sticks for support. In the following spring they may be transplanted to their permanent location in the vineyard or garden. The ground for their reception should be moderately light and rich, and loosened to the depth of at least 18 inches.

Make a hole about 8 inches deep, then throw in soil so as to raise a small mound in the center of the hole, about 2 inches high; shorten the top of the young vine to about 6 inches, and then place it on the mound, spreading its roots well in all directions; fill up with well pulverized soil, until the upper eye is even with the surface of the ground. Then press the soil lightly, place a good stake about 4 feet high with each vine, and when the buds start, allow but one sprout to grow, which is to be tied neatly to the stake. The vines may be planted in rows 6 feet apart, and 3 feet apart in the rows, as many of them will prove worthless, and have to be discarded. Allow all the laterals to grow on the young cane, as this will make it stocky and short-jointed. Cultivate well and frequently, keeping the soil loose and mellow.

The second season the seedlings will generally make from 3 to 4 feet of short-jointed growth; in the fall of that year they should be cut back to about three

buds, and have the ground drawn up around them for protection in winter. Should any of them look very promising, fruit may be obtained a year sooner by grafting the wood of the seedlings upon strong vines. Young vines thus grafted will generally bear the next season (see "Grafting," on another page). Next spring, which will be their third, remove the covering, and when the young shoots appear, allow *only two* to grow. After these have grown about 18 inches, pinch off the top of the weakest of the two shoots, so as to throw the growth into the strongest shoot, which is to be kept neatly tied to the stake or trellis, treating it as the summer before, and allowing all the laterals to grow. At the end of this season's growth they should be strong enough to bear the next summer. If they have made from eight to ten feet of stocky growth, the leading cane may be cut back to ten or twelve eyes, or buds, and the smaller one to a spur of two eyes. If the vines will fruit at all, they will show it the next summer, when only the most promising ones should be kept, and the barren and worthless ones discarded. Seedlings have this peculiarity: both the berry and bunch will increase in size every year for the first three or four years; therefore, if the quality of the fruit is only good, the size may come in time. The fruit of the Elvira (of which more hereafter), which is now about as large in bunch and berry as Catawba, was at first not more than half its present size, it having increased in dimensions every year for the last eight years.

REESE LIBRARY OF THE UNIVERSITY OF CALIFORNIA

CHAPTER III.

PROPAGATION BY CUTTINGS IN THE OPEN AIR.

The easiest and most simple mode of propagating the vine is by cuttings planted in the open ground; it can be successfully followed with the majority of the *Labrusca* and *cordifolia* varieties, and a few of those from the *æstivalis*, although the latter will not take root readily, and had better be propagated by layering and grafting.

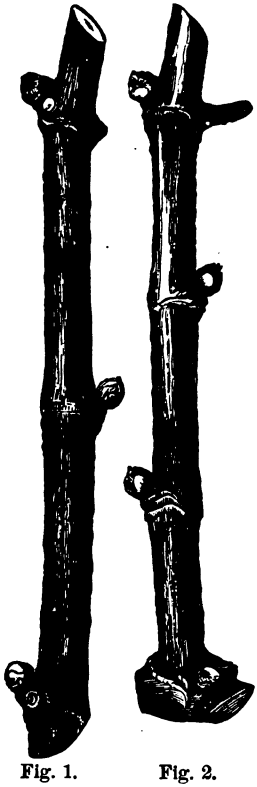


Fig. 1. Fig. 2.
CUTTINGS—ALL NEW AND PART OLD WOOD.

The most general method is the following: In fall, when pruning the vines, choose the best ripened wood of medium size, which is better than either the very large or very small, and cut it into lengths of from 9 to 12 inches, cutting close below the lower bud, and about an inch above the upper, as in figure 1.

Figure 2 shows a cutting with part of the old wood attached; cuttings of this kind will generally root more readily than the other. These cuttings will mostly average three to four buds each; tie them in convenient bundles of 100 to 250 each, taking care to make their lower ends even, and keep them either in a cool, moist cellar, or bury them out-doors in well drained ground, with the upper ends downwards, covering up well with finely pulverized soil. The making of

cuttings may be continued during winter, although they will root more readily if cut early, and there is also no danger of frost injuring the buds.

In spring, so soon as the ground is dry enough, the cutting bed should be prepared. Choose for this a light, rich soil, pulverized at least a foot deep; if not light and rich enough, it can be made so by well-decomposed leaf mould. Make a cut along the whole length of the bed with the spade, deep enough to receive the whole length of the cuttings, and press these well down into it, so that the upper buds are even with the surface of the earth; fill up with loose soil, and press it down firmly with the foot along the line, so as to pack it well around the cuttings. The cuttings may be put close in the row, say 1 to 2 inches apart, and the rows 2 to 3 feet apart, so as to allow of cultivation either by hand, plow, or cultivator. After the bed is finished, mulch with spent tan, sawdust, or leaf mould, so as to protect the young shoots from the sun; maintain a moist and even temperature during summer, and keep the soil open and porous.

Keep the soil of the cutting bed clean during the summer. The young vines will generally make a hard, firm growth 1 to 4 feet in length the first summer; they will make their roots just where they ought to be, and will be by far the best plants for general use, being preferable to vines raised either from single eyes or by layers. In the fall they should be carefully taken up, and heeled-in in well pulverized soil, deep enough to cover the crowns, first assorting, so as to make them as even in size as possible for planting. They are then ready for setting in the vineyard, and a good strong one-year-old vine is, beyond a doubt, the best for that purpose.

CHAPTER IV.

PROPAGATING THE VINE BY LAYERS.

All varieties of the grape may be readily increased by layering, but it is especially valuable for those hard-wooded varieties of the *æstivalis* species, which will not grow readily from cuttings, and vines thus propagated will, if handled rightly, make very good plants. To layer a vine, shorten in the canes of the last season's growth to about one-half their length, then, early in the spring, prepare the ground by the use of the spade or fork, to thoroughly pulverize it. Make a small furrow about an inch deep, bend down the cane and fasten it firmly in the bottom of the furrow, with wooden hooks or pegs. The canes may be left thus until the young shoots have grown from 6 to 12 inches, then fill up around them with fine soil or leaf mould. Canes so layered will generally strike root at every joint. The shoots may be tied to small sticks, and when they have grown a foot, their tops should be pinched to make them more stocky. In the fall take them up carefully, commencing to dig at the end furthest from the vine, and separate the plants, by cutting between the joints, so that each shoot has a system of roots by itself. They are then either planted immediately, or heeled in, as described for vines from cuttings, to be planted in the spring.

CHAPTER V.

GRAFTING THE VINE.

The advantages of grafting are: 1. The facility by which new and rare varieties may be rapidly increased by grafting on strong, healthy old vines; thus treated they often grow from 10 to 20 feet the first season, producing an abundance of wood to propagate from. A striking illustration of this may be seen in the vineyards of Messrs. Poeschel & Scherer, at Hermann, Mo., who commenced five years ago with five eyes of the Elvira, and now have 2,500 bearing vines of that variety, all grafted on strong Concord stocks. 2. The short time in which fruit can be obtained of new and untried varieties, as the grafts will generally bear the second season. 3. The facility by which vines of varieties, the fruit of which may be worthless, can be changed into valuable bearing vines. 4. The advantage it offers to us in avoiding that invidious enemy, the Phylloxera, as we can graft varieties, the roots of which are subject to its ravages on those kinds which are Phylloxera proof, and can facilitate the growth of naturally weak varieties, and make them more vigorous, by grafting on strong growing stocks. 5. Varieties which will not grow readily from cuttings can generally be grafted easily; hence this method is especially valuable to increase the varieties of *æstivalis*.

The vine, however, does not graft with the same ease as the apple and pear, and it is, therefore, a more uncertain operation. Moreover, to insure success, it should be grafted below the ground, which makes it a disagreeable operation, and one quite difficult to perform, hence it will hardly become a general practice. But for the purposes above mentioned, the operation is sufficiently important to make it desirable that every vineyardist should be able to perform it.

Here, the best success generally is attained when we graft in March, although it may be done as late as May. Dig away the ground around the vine, until a smooth place upon the stem is found, then cut it off smoothly, and insert one or two scions, as in common cleft grafting, taking care to cut the lower part of the scion to a very thin wedge, as shown in figure 3, leaving two eyes on the scion to insure better success. Care should be taken to insert the scion properly, as the inner bark or liber of the vine is very thin, and the success of the operation depends upon a perfect junction of the stock and scion. If the vine is strong enough to hold the scion firmly, no bandage is necessary; if not, the scion should be tied with a ligature of bast, or Bass-wood bark, applied evenly and firmly. Finish the operation by pressing the earth firmly around the cut, and fill up with fine soil to the top of the scion, or cover it up with sawdust. Examine the stock often, and remove all suckers that appear from time to time, as they will rob the graft of its nourishment. Do not be discouraged if the scion does not start at once. Scions will often remain dormant for a month, and then start and grow with astonishing vigor; such are generally more sure to grow than those which start prematurely, before a firm junction is effected between the stock and graft. This is an old method of propagating which has been very successful with me. Another, and a very good one, is the following: "Make a slanting cut in the stock, from the side, downwards towards the middle, then cut your scion to a simple wedge, and push it down on one side, so as to join the bark of the stock. This has the advantage that the stock need not

Fig. 3. SCION FOR GRAFTING.

be cut off, in case the scion should not unite with it, and as the fibres of both scion and stock are cut transversely, the pores join better. As soon as the scion starts, cut off the stock above it, taking care, however, not to move the scion in the operation."

The following is copied from the Seventh Annual Report of the State Entomologist of Missouri (1875); the methods described are mostly to counteract the Phylloxera, by establishing the graft upon Phylloxera proof roots, and preventing it from making roots of its own:

"There are several methods of grafting above ground, which I have every reason to believe may be made more successful than grape-growers have hitherto supposed; the first is, by making a false surface and grafting in the manner just described, but instead of digging away the earth and inserting the scion several inches below ground, it should be inserted above ground, and the earth thrown up around it, to be removed after the graft is thoroughly and permanently joined. There will be no danger of the graft forming its own roots, and it is certainly as easy to throw the earth around the vine as to dig it away, while the work can be more easily performed above than below the surface. No doubt this method of grafting needs greater care, especially in dry seasons, as the mound is more apt to dry out than the level ground. Yet there is evidence that this method will work well in our soil and climate. Mr. Jno. Vallet, of New Haven, Mo., a grape-grower of much experience, has had good success in this grafting above ground, using flax twine and pawpaw bark for bandages. He considers that the vine grows more vigorously (which I am inclined to doubt), and that there is less danger of separating the graft when the union is once formed, as it is not necessary to go below ground to destroy the suckers, by which the grafts are sometimes disturbed."

"The second method is by inarching. This system of

grafting does not seem to have been practised much in this country; yet, while it requires great care, and may not be as generally successful as the former methods, I hope more attention will, in future, be given to it. The operation is simple: A slice of 2 or 3 inches long is cut from one side of the vine to be grafted with, and a similar slice from the one which is to serve as stock, as near to the base as possible (of course, graft and stock must be close together). The two cut portions are then brought face to face, so as to fit neatly, and are bound together with Bass-wood bark, or other grafting bandage, and wrapped in moss, which should be kept moist. In the course of a fortnight, partial union takes place, when the bandage should be slightly loosened, to allow of expansion. In six or eight weeks, if successful, the stock and scion are firmly united, when the bandage may be removed. The graft immediately below the union, and the stock immediately above it, should then be cut in a week or two." This method has been successfully followed by Mr. Eugene Cambre, of Nauvoo, Ill.

Mr. Cambre, in giving his experience, writes: "I have positively abandoned cleft grafting; it is too much trouble and too uncertain, and the graft often makes its own roots. I assure you that from a long experience in inarching, I am of the opinion that not alone the Delaware, but most of our cultivated varieties, will do better on native wild roots than on their own. I have 14 acres of vines mostly grafted in this manner on wild stocks, and I have not lost one of such grafts. It is preferable to graft at from 10 to 15 inches from the ground."

Another mode of grafting above ground is thus given in "The Cultivation of the Grape," by W. C. Strong:

"In 'The Gardeners' Monthly,' Vol. II., p. 347, is a description of a mode practised with success by Mr. Cornelius, which we copy, not merely as it is interesting in

itself, but also because it illustrates many other modifications in grafting:

'After the first four or five leaves are formed, and the sap is flowing, you choose the place on the vine where you intend to graft. At that point wrap tightly a twine several times around the vine. This will, in a measure, prevent the return sap.

'Below the ligature, make a sloping cut down, as shown at figure 4, *a*; also, a similar reversed one above the ligature, as at *b*, about one inch in length. In selecting a scion prefer one that has naturally a bend. Cut it so that it shall be wedge shaped at both ends, and a little longer than the distance between the cuts in the vine at *a* and *b*. Insert the scion, taking care to have the barks in direct contact, securing it with a string, *c*, bound round both scion and vine sufficiently tight to force the scion ends into their places. If the work is done well, no tie will be required at *a* and *b*, but the joints should be covered with grafting wax. In a short time, the bud at *d* will commence its growth, after which you can by degrees remove all the growing shoots not belonging to the scion, and in course of the summer you may cut off the wood above *b*, and in the fall remove all above *a* on the stock, and above *c* on the scion."

Fig. 4.—GRAFTING ABOVE GROUND.

"Still another mode of grafting remains to be mentioned, which has, I believe, seldom, if ever, been attempted in this part of the country, but which has been employed with much satisfaction the past year by a few vine growers in France, and especially by

M. H. Bouschet, of Montpelier. It is the winter grafting of a cutting of such variety as is desired to grow upon another which is to be used as stock, the combined cuttings being planted in the usual manner in spring, leaving only the buds on the graft proper out of the ground. This is very similar to our ordinary mode of making apple grafts; and while we have little or no experience in this country on which to base anticipations, the method is worthy of trial, and is illustrated at figure 5."

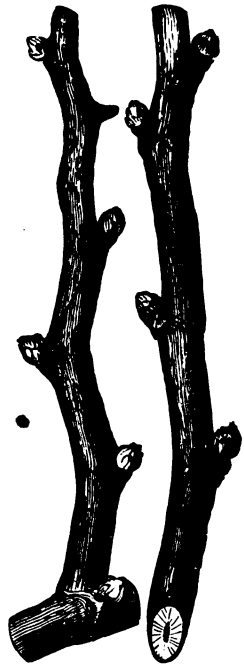


Fig. 6. Fig. 5.
GRAFTED CUTTINGS—PART OLD AND ALL NEW WOOD.

"But not to weary with details, I here reaffirm my belief, strengthened by each further observation, and by every additional experience of the past year, that just as the working of the Root-louse is the primal cause of failure of some of our choicest varieties of the grape-vine, so in judicious grafting we have the most available means of counteracting its work, and of thus growing successfully many of those kinds which cannot be grown in this latitude with any profit or success on their own roots."

I have omitted propagation by single eyes, as this method is now only followed by nurserymen, for the purpose of increasing new and valuable varieties. As it involves the expense of a propagating house, it can be of little value to the vineyardist, and those who intend to follow it professionally, are generally proficient already.

CHAPTER VI.

THE VINEYARD.—LOCATION, ASPECT, AND SOIL.

As the selection of a proper location for the vineyard is of first importance, and one of the main conditions of success, great care and judgment should be exercised in the choice. Nearly any soil will grow grapes, at least for the table, and some varieties are so hardy and thrifty, that they can be grown almost anywhere, but with grapes on a large scale, either for market or wine, or both, good and paying results will only be reached in the best locations.

When writing my first little book I was under the impression that the hillsides along our larger streams were best adapted to the growth and health of the vine. After six years' experience in Southwest Missouri, on the prairies and high uplands removed from all larger streams, I have changed my opinion entirely, and now believe that the dry atmosphere and cool breezes of these uplands are much more conducive to the health of the vine. We know but little of rot or mildew here, even in the last five exceedingly wet summers, when the grape crop along the Missouri and Mississippi rivers, with the exception of a few such ironclads as Norton's Virginia, Cynthiana, Ives, and Elvira, was almost a failure. Those localities may generally be considered safe for the grape, in which there are no miasmatic influences. Where malaria and fevers prevail, there is no safety for the crop, as the vine seems to be as susceptible to such influences as human beings.

Keeping this fact in view, we may consider our high table lands and hillsides, where the vines are fully ex-

posed to the prevailing winds in summer, our best locations. These are also generally free from frost late in spring and early in fall, which is another important consideration for the vineyardist. The soil should be naturally well drained, as the vine does not like to have "wet feet;" therefore, tenacious sub-soils, so-called "hard-pans," should be avoided. I have seen equally good results in limestone as in sandstone soils, though it will generally hold good that a sandy, and at the same time moderately rich soil, is better adapted to most of our varieties than heavy clay. We have thousands of such locations, and no where have I seen more beautiful grapes than on the sandstone hills around Warrensburg, in this State, (a neighborhood noted at the same time for its famous sandstone quarries,) although the hillsides, at first sight, appear rather poor. The professional grape-grower, therefore, can find abundant scope, and should certainly look after such locations. The amateur, however, who only wishes to grow grapes on a small scale, and for home use, can easily make his soil light by an addition of sand, and occasionally lime. Let him choose the spot on his grounds which seems best adapted to his purpose, and although he may not grow as rich grapes, yet he will grow them good enough, and abundant enough, if he chooses the proper varieties.

CHAPTER VII.

PREPARING THE SOIL.

For the preparation of the soil, the foundation of his work, the grape grower must be guided in his operations by the condition in which he finds his ground. If it is an old field, free from stumps and stones, or a piece of prairie soil, it will be easily prepared. Break up the soil with a good large turning plow and strong team to pull it, and follow in the same furrow with a subsoil stirring plow, which merely loosens the ground; and do this as deep as possible, if 20 inches, all the better, though 16 inches in all will do if you cannot go deeper.

If, however, the land is a new piece of forest soil, the task will be much more difficult. This must be carefully grubbed of stumps and roots, and although the same implements will, in a measure, suffice, yet the turning plow should have a sharp coulter in front, and the subsoil plow should also have a strong and sharp coulter, with merely a wedge-shaped, strong share to stir the soil. Besides, much more power will be necessary. In stony soil, the pick and shovel must take the place of the plow, as it would be impossible to work it thoroughly with the latter; but I think there is no advantage in the old method of trenching or inverting the soil. If we examine the wild vines of our forests, we will generally find their roots running along in the surface soil. It is unnatural to suppose that the vine, the most sun-loving of all plants, should have its roots buried several feet below the surface, where neither sun nor air can reach them. Work the soil well and thoroughly, and as deep as you can, it will be labor well invested; will be the best preventive against drouth, and the best drainage in wet weather, but leave it in its natural position, and do not

plant too deep. Rest assured if the roots find anything congenial below, they will hunt it up. Should the soil be very poor, it may be enriched by ashes, bone dust, manure, etc., but it will seldom be necessary, as most of our soil is naturally rich enough, and it is not advisable to stimulate the growth too much, as it will become rank and unhealthy, and impair the quality of the fruit.

Wet spots may be drained by gutters filled with loose stones or tiles, and then covered with earth. Surface draining can be done by running a small ditch or furrow, every sixth or eighth row, parallel with the hillside, and leading into a main ditch at the middle or end of the vineyard. Steep hillsides should be terraced or benched, but as this is laborious and expensive, they should be avoided.

CHAPTER VIII.

WHAT GRAPES TO PLANT.—CHOICE OF VARIETIES.

This is, indeed, a difficult matter to decide in a vast country like ours, where soil and climate differ so much, and I think it a great mistake into which some of our most prominent grape-growers have fallen, to recommend any grape for general cultivation, simply because it has succeeded with them. Grape growing is, perhaps, more than any other branch of horticulture, dependent upon soil and climate, and it will not do to dictate to the inhabitants of a country where the extremes meet, that they should all plant the same varieties. Yet this has been done by some who pretend to be authorities, recommending the same grape for planting North and South, East and West, which certainly shows that they have more arrogance than knowledge. I have seen such widely

different results, in vineyards closely adjoining, that I have become reluctant to recommend, even to my nearest neighbor, what he should plant.

In the East and North the demand is still for something earlier than we yet have, while here in the West we do not desire the early grapes so much, at least, not for wine making purposes. The earliest, so far, seem to come from the *Labrusca;* those who desire still earlier grapes, will have to look to these mostly, and it seems as if the Early Champion is a step in that direction, being better, and, as its friends claim, ten days earlier than the Hartford Prolific. From Southern Texas my friend and correspondent, G. Onderdonk, of Victoria, writes to me, that it is useless to cultivate the *Labrusca* there, as it will not succeed, and their grapes are emphatically the Warren (or Herbemont), and the Black Spanish (so-called, but the *true Lenoir*), both belonging to *æstivalis* of the Southern class. The varieties of *Labrusca* cannot stand their summers, and this fact, with their failure in France, where also they can not stand their hot and arid summers, lead me to the supposition that their tendency to root near the surface is the cause of it. The varieties of *æstivalis* and *cordifolia* all root deeper, and are, therefore, better calculated to withstand the severe drouths.

We, here in Missouri, are centrally located, and while it will be well to cultivate some of the early varieties of the *Labrusca* for market and early table, our reliance for the main crop will, in future, be the *æstivalis* and *cordifolia,* all the more so, as they are exempt from the ravages of that insidious little enemy, the Phylloxera, to which the greater part of the *Labrusca* varieties are subject, and which may be, in a great measure, the cause of their frequent failure. With these few general remarks, which may serve somewhat to guide the planter in a selection, I will now describe a few of the most prominent and reliable of each class of the older varieties,

Fig. 7.—GOETHE (ROGERS' HYBRID NO. 1). (33)

UNIVERSITY
CALIFORNIA.

together with some of the most promising, giving at the end a list of varieties which promise to be generally successful for the East and North, one for the central section of our country, and one for the extreme South.

CHAPTER IX.

LABRUSCA CLASS, WITH THEIR HYBRIDS.

CONCORD.—This is too well known to need any particular description. It was considered, until lately, one of the most reliable and productive, but for the last few years has rotted so badly, that it is now considered unreliable by a great many. The fruit is of fair quality, very handsome, too soft to carry well to market, and will not keep. Will, with skillful handling and a little artificial heat, make a wine of fair quality, of a very enlivening and invigorating character, which is emphatically the "poor man's" drink, as it can be produced cheap, and is just the beverage he needs, instead of the poisonous compounds called whiskey and brandy. A rampant and hardy grower, not subject to Phylloxera, and will, perhaps, bear more overcropping and neglect than any other. Has been very valuable, but I think will be superseded by better sorts so soon as they become better known. Specific gravity of *must* 76°.

CATAWBA.—Also too well known to need description. Although very unreliable, it yet holds its place among wine grapes, especially on the Lakes, and although I would not recommend it generally, it does succeed in some sections, and is a good grape where it can be grown, making a high-flavored and sprightly wine. It is very much subject to the attacks of Phylloxera, and this alone

is enough to make any one hesitate to plant it, when varieties so much better can be had. Specific gravity of must 80°. On a recent trip I have seen the Catawba in such perfection on the Lakes in Western New York, that it would seem to me it is still the grape for them. When they can grow from fifteen to twenty pounds to the vine, as I have seen on Crooked Lake, without a rotten berry, or blemish, and the must going up to 96°, they ought to plant Catawba still, although I do not consider it a perfect grape even there.

ESSEX.—(*Rogers' Hybrid No.* 41). This is a beautiful and good grape, and with me, has generally given satisfaction. Bunch medium, shouldered; berry very large, double the size of Concord, round, black, with blue bloom; skin thin, pulp tender, juicy, sweet, and vinous, with hardly any native aroma. Vine a good grower, abundant bearer, and little subject to disease. Ripens with Concord.

GŒTHE.—(*Rogers' Hybrid No.* 1). For us in the West this is one of the most reliable and best of all the *Labrusca* class, and has no foxiness, but some of the flavor of its *vinifera* parent. I have seen it succeed equally well near Baltimore and Washington City. Many have failed to succeed with this, and also others of the Rogers' Hybrids, for the simple reason that the vines are luxuriant growers and very abundant bearers, and the vines were taxed beyond their strength when young; did not ripen their fruit or wood well, and were enfeebled for years to come. But with rather short pruning, severe thinning of the fruit when young, and allowing the vine only from 10 to 15 lbs. of fruit per year, good results can be gained nearly every year. This will apply to all the Rogers' Hybrids. Bunch medium to large, rather loose, shouldered; berry very large, oblong, very good when yet white, when it resembles the Malaga, pale red when fully

UNIVERSITY
OF
CALIFORNIA

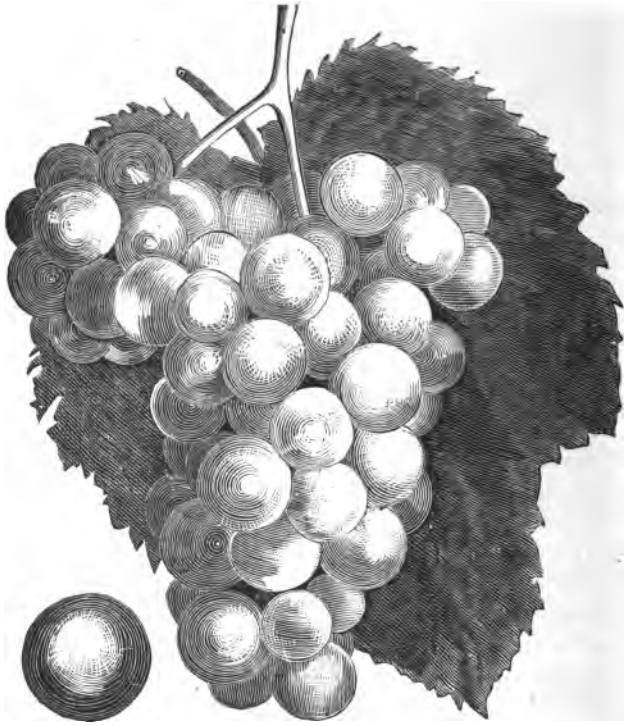


Fig. 8.—MARTHA.

ripe; skin thin, pulp tender, juicy, sweet, and luscious, with fine Frontignan flavor. Fine for table and market, and makes a very delicate white wine, superior to Catawba. Specific gravity of must 80°. Vine a strong, rampant grower, with peculiar mottled foliage, ; generally healthy and hardy, though occasionally subject to rot. Ripens with Catawba. Fine on the Lakes, though it develops a stronger feline flavor there.

IVES.—Whoever is satisfied with a grape which is healthy and hardy, and an abundant bearer, but of very poor quality, may plant the Ives. I confess that I would rather not have any grapes if I could not have better than the Ives. It is well enough known to need no description, and, in fact, deserves none, but it will yield an abundance of fruit, which will color early, generally spoils the market for good grapes; hangs well to the bunch, and will do for stewing and preserving, also makes a tolerable Claret wine, if allowed to hang very long, and fortified with sugar. Specific gravity of must 72°.

LINDLEY.—(*Rogers' Hybrid No.* 7). Bunch large and long, moderately compact, shouldered; berry medium, about the size of Catawba, round, pale red, with beautiful violet bloom, sweet, juicy, and high flavored; skin not thick, but tough, which makes it keep excellently. Ripens about the same time as Catawba; an abundant bearer, a strong, long-jointed grower, and a valuable table and market grape, especially on account of its keeping qualities, though too high flavored for wine.

MARTHA.—Originated with Samuel Miller, at Calmdale, Pa., and has long held its place as "the best white grape for everybody," on account of its health, productiveness, and fair quality for table and wine. It is a seedling of the Concord, and a decided improvement on it. Bunch medium, moderately compact, shouldered; berry medium,

smaller than Concord, round, greenish-yellow, with white bloom; skin thin, pulp softer than in Concord, juicy and sweet; good when just colored; when dead ripe it becomes somewhat insipid and foxy. Vine a strong, healthy grower, succeeding on almost any soil; fruit less liable to rot than Concord, and containing more sugar; also retains but little of its foxy character in its wine, which resembles good Catawba. Specific gravity of must 85°. This is certainly a valuable grape, as it is also even hardier than the Concord, but will now, it is very likely, be superseded by the Elvira.

MASSASOIT.—A very early grape of excellent quality. Bunch medium, compact, shouldered; berry above medium, pale red, with lilac bloom, slightly oblong, very juicy, sweet and fine flavored; the best early grape I know, ripens about as early as Hartford Prolific, and when merely soft, is better than Hartford at its prime. Is full as early as Delaware, to my taste better, and will succeed more generally than that. A beautiful and good market and table grape, and also makes a very fine wine. Vine a good grower and bearer. Specific gravity of must 85°.

PERKINS.—Those who do not object to a good deal of foxy aroma, will be pleased with this, as it is very early, hardy, and productive. Bunch medium, rather loose, shouldered; berry oblong, pale red, with fine lilac bloom, sweet, but foxy; apt to drop from the bunch when very ripe. Ripens as early as Hartford Prolific, healthy, hardy, and very productive; generally sells well in market; a strong grower, with thick, leathery leaves.

SALEM.—Bunch full medium, compact, shouldered; berry large, round, of a peculiar brownish color, with lilac bloom; juicy and sweet, with a peculiar pleasant aroma; considered by Mr. Rogers to be the best of his Hybrids, but it is not so generally successful here as Gœthe,

REESE LIBRARY
UNIVERSITY
CALIFORNIA

Fig. 9.—WILDER (ROGERS' HYBRID NO. 4). (42)

Lindley, Massasoit, and Wilder. It is very apt to overbear, and should be thinned severely. Ripens about same time as Catawba.

TELEGRAPH, OR CHRISTINE.—An early grape of very fair quality. Bunch medium, very compact, shouldered; berry medium, black, with blue bloom, juicy, sweet, and good for so early a grape, as it ripens with Hartford Prolific. A strong and healthy grower, dark brown wood, and very productive, though sometimes rotting severely.

WILDER.—(*Rogers' No.* 4). A beautiful and very good grape. Bunch large and heavy, shouldered, moderately compact; berry large, round, black, with blue bloom, tender pulp, sweet, juicy, and refreshing, without foxiness, ripens earlier than Concord, and is nearly as large and as good as Black Hamburg. Vine a good grower, and generally healthy, but very apt to overbear, and the fruit should be thinned severely. Fine for table and market, and makes an agreeable light, red wine. Specific gravity of must 78°.

These are the most prominent and best tried of the *Labrusca* class. The following are of good quality, but have not been so generally tried; they may be classed as "Promising well":

AMINIA.—(*Rogers'* 39). Bunch medium, moderately compact, shouldered; berry full medium, round, black, sweet, vinous, very good. Ripens earlier than Hartford, and is much better in quality; may, therefore, be valuable for early market. Somewhat subject to rot. Vine a good and clean grower, very productive.

BARRY.—(*Rogers'* 43). Bunch full medium, moderately compact, shouldered; berry large, round, black, with blue bloom, in quality much like Wilder, though a little more astringent; vine a good grower and bearer; ripens with Concord. A handsome market and table grape. Very successful on the Lakes, and at Rochester.

BEAUTY.—One of the seedlings of Mr. Jacob Rommel. a cross between Delaware and Maxatawney; has been vigorous and healthy so far; a strong grower, and very productive. It has fruited seven years in succession. Bunch full medium, compact, shouldered; berry about the size and color of Catawba, oblong, covered with lilac bloom. Ripens here the last week in August. Sweet, exquisite flavor; thin, but rather tough skin, tender pulp. This promises to keep well, and as the bunches are very even and attractive in appearance, it may be a very valuable market grape, as it is superior in quality to Delaware; and as it excels the Catawba in fine and delicate flavor, and is without its harshness and austerity in pulp, it will very likely make a very fine, high flavored wine. I consider this the most promising of all our varieties of the *Labrusca.*

BLACK EAGLE.—Originated with Mr. Stephen Underhill, at Croton Point, N. Y. A hybrid of *Labrusca* and *vinifera.* A new early table grape of very fine quality. Bunch large, moderately compact, shouldered; berry large, oval, black, with blue bloom, flesh rich and melting, with little pulp. The vine is a straight, handsome grower, the leaf deeply lobed, dark green and heavy; shape of the foreign. Very promising so far.

BLACK DEFIANCE.—Same origin as the preceding. A hybrid between St. Peters and Concord. Bunch large; berry large, above Concord, black, with a fine bloom, sweet, vinous, and juicy; ripens several weeks later than Concord, and should it prove healthy and hardy, is about the best late black table grape we have.

EARLY CHAMPION.—Brought out by J. S. Stone, Charlotte, New York. Said to be ten days earlier than Hartford Prolific, of better quality, very hardy and productive, and if this is so, it certainly deserves trial as an early market grape.

EVA.—A sister of the Martha, raised by my friend Miller, at the same time, but has been sadly neglected. Our friend Campbell claims that it is better than Martha. To me it seems to be nearly the same.

LADY.—Mr. George W. Campbell claims for this that it is the best and earliest white grape now grown, and it is certainly a good and beautiful fruit, when just colored. I had occasion to taste it a number of times, and found it best when just soft; the riper it gets, the more insipid and foxy it becomes. So far it has not given satisfaction as a grower and bearer here, and has also rotted badly; but friend Campbell generally knows whereof he affirms, and it must be good in Northern Ohio, from all I can learn. Bunch medium, compact; berry full medium, pale yellow, with white bloom, pulp tender, sweet, juicy. Said to be ten days earlier than Concord.

TRIUMPH.—A hybrid between Chasselas Musqué and Concord, grown by Geo. W. Campbell, Delaware, Ohio, and considered by him too late for that section, and wanting in character. Here in Missouri it ripens to perfection, and is certainly one of the most attractive white grapes for the table I have yet seen. Friend Miller, of Bluffton, has it in propagation, and has fruited it several years. Bunch large and heavy, shouldered, moderately compact; berry very large, golden-yellow, transparent, with delicate bloom; skin thin, pulp tender, sweet, juicy, and excellent. Ripens about with Catawba. It seems to be hardy and tolerably healthy, as it has rotted less than Concord, and it, therefore, certainly deserves a trial, as such grapes as it produces are a feast to any one, and would readily sell at 25 cents per pound. Succeeded finely *here* last summer.

On a recent Eastern round among the vineyards of Western New York, I examined the following, which I

think may safely be added to the list of "Promising well." The Prentiss and Mr. Ricketts' seedlings I saw on the grounds of the originators, at Crooked Lake and at Newburgh, and under circumstances which I thought not at all favorable to their highest development. I think it my duty to state this, as I had been led to believe that Mr. Ricketts' seedlings had been petted, pampered, and protected, all of which I found just the reverse, and came to the conclusion that the treatment they received was not at all calculated to develop their best points.

BRIGHTON.—Seen on the grounds of Mr. E. Hooker, Rochester. Vine very productive, foliage moderately healthy, though perhaps not so healthy as Concord. Bunch large, shouldered; berry medium, about size of Catawba, round, brownish-red, very handsome, sweet, without being insipid; to my taste better than Delaware, because more vinous; pulp tender, very juicy. Very promising.

EARLY DAWN.—Good in quality, said to be very early, hardy, and productive. Bunch medium; berry full medium, black, sweet, and good.

MOORE'S EARLY.—Seen at the exhibition at Rochester. Although not very good in quality, it is a very handsome bunch and berry, and seems to be especially valuable at the North, on account of its extreme earliness. Bunch very large and shouldered, compact; berry large, resembling Wilder in size and form, black, fair in quality, but not high flavored or tender in pulp. Its chief value seems to be its early ripening, vigor, and hardiness.

NIAGARA.—Seeds planted in 1868, first fruited by Hoag & Clark, of Lockport, N. Y., in 1872. Cross between Concord and Cassady; bunch very large and heavy, compact; berry large, slightly oblong, semi-transparent, greenish-white, bronzed in sun, adheres well

to the bunch, flesh tender, sweet and melting, good flavor, skin tough, and bears handling well; said to be as early as Hartford in ripening, but keeps well on the vine; foliage thick and healthy, vine strong grower and hardy, bears very abundantly. This is the description of the originators. They say that a vine four years planted, is bearing 40 lbs. of superior fruit. I saw the grape at Rochester, and was pleased with size of bunch, quality, and general appearance. A promising market grape.

POCKLINGTON.—This is, certainly, a "big thing"; though not of the best, or even very good quality, will sell. A seedling from Concord, grown by John Pocklington, of Sandy Hill, Washington Co., N. Y. Vine a strong grower, with immense leaves, very heavy in texture, and is said to never mildew. Bunch very large and heavy, shouldered; berry nearly an inch in diameter, pale yellow, covered with bloom, round, quality about like Concord. It was not fully ripe when I saw it. Mr. John Chorlton, who offers it for sale, claims that it becomes very juicy and sweet to the center. Very promising as a market grape.

DUCHESS. — Originated with Mr. N. J. Caywood, Ulster Co., N. Y., who also originated the Walter, and I will only hope that this will be more generally successful. Bunch medium to large, often 8 inches long, shouldered, compact; berry medium, round, greenish-white; skin thin, flesh tender, without pulp, sprightly, rich and vinous. Its originator claims for it that it has been grown in different localities, North and South, for the last ten years, and has never failed; that it has but one small seed, that it will hang on the vines until frost, bear transportation better than any other variety, and that it excels in growth the Concord, Clinton, and Taylor. When we remember how Mr. Caywood also claimed su-

perior excellence and hardiness for the Walter, which has so utterly failed in most sections that it is now rarely seen, we would accept his testimony with a good deal of caution, and make allowance for his enthusiasm, but the quality and appearance of the fruit, as we saw it, certainly warrants trial.

PRENTISS.—This is now in the hands of that enterprising grape-grower, T. S. Hubbard, of Fredonia, N. Y., and not yet offered for sale. He sent me a bunch in 1878, which impressed me very favorably. The show at Rochester was grand, and I determined to see it on the grounds of its originator, and copy from the notes taken there. Mr. Prentiss is an enthusiastic grape-grower, but very cautious in recommending anything new, which, perhaps, has kept his seedling in the dark so long, as he has fruited it for nearly twenty years. The original vine stands in rather a poor location, on the side of a ravine, and had an immense load of fruit, but made a good growth of wood nevertheless. I think its present crop would come to 25 lbs. at least. The bunches were all perfect, though backward in ripening. It is a seedling of Isabella; bunch medium, very compact, occasionally shouldered; berry medium, slightly oblong, resembling Rebecca very closely, and about the same quality, greenish-white; skin tough and firm, enabling it to carry to market in good condition; sweet and good, though not of high character. Mr. Prentiss has quite a number of vines of it in bearing, in different parts of the vineyard, all heavily loaded. Foliage also resembles Rebecca, but is larger, not so deeply lobed, thicker, and more leathery. He ships to New York markets, and readily obtains 16 cents per pound for all he can send of the Prentiss. The particular location near the lake may have something to do with this eminent success, but the grape certainly deserves trial as a market grape in other sections. I think it lacks the sprightliness of a good *wine* grape.

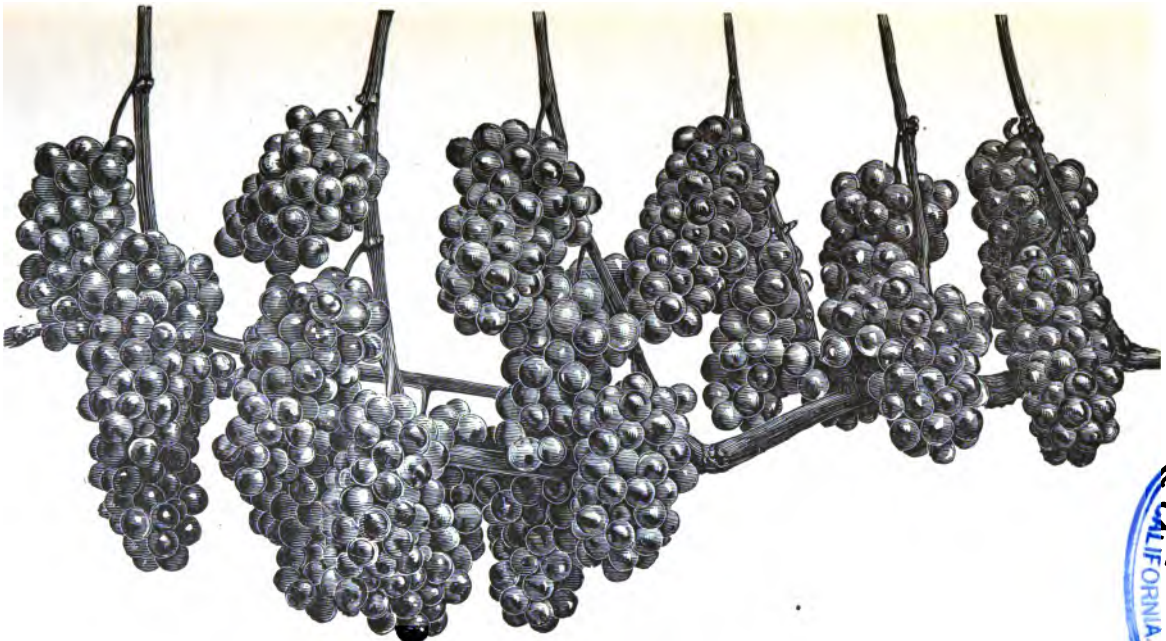


Fig. 10.—PRENTISS.—(*From a Photograph.*)

REESE LIBRARY OF THE UNIVERSITY OF CALIFORNIA

REESE LIBRARY
OF THE
UNIVERSITY
CALIFORNIA

Mr. Pentiss has also two other seedlings, which I think highly promising, not yet named, of which I made the following notes :

No. 1.—Bunch very compact, seldom shouldered, medium ; berry medium, round, black, with blue bloom, very sweet, pulp tender, buttery, taste pure, without foxiness, with considerable coloring matter in its skin. Ripens fully as early as Concord ; promising for red wine ; vine a good grower, healthy, and productive ; fruited about 5 years; never rotted.

No. 2.—Bunch long, loose, not shouldered ; berry, round, a trifle larger than Catawba, dark red, pulp tender, vinous, fine flavor, better than Catawba, with a very pleasant mingling of acid and sweet ; seems to be healthy and productive ; fruited for the first time.

Mr. Ricketts' seedlings :

Foremost among these, in our estimation, is the

LADY WASHINGTON, which is a magnificent grape, and its robust growth and large, leathery leaves, give promise of health elsewhere as well as in its native locality. The original vine has now fruited five seasons. It is a seedling of Concord, crossed with Allen's Hybrid. Bunch very large and long, rather loose, shouldered, often weighing a pound and a half ; berry full medium, round, white, with a rosy tint when exposed to the sun, transparent, juicy, sweet, and good.

JEFFERSON.—This is now in the hands of Mr. J. G. Burrows, of Fishkill. Cross between Concord and Iona. Vine vigorous and productive, leaves large, thick, downy, wood short-jointed ; bunch very large, often with double shoulder, very compact ; berry large, roundish oval, light red, with thin lilac bloom, flesh meaty, or solid, tender, juicy, sweet, but sprightly.

HIGHLAND.—Good healthy leaf ; large, fine bunch ;

berry black, large, round, very showy, and good in quality.

RICKETTS' No. 1.—A hybrid of Israella and Muscat Hamburg, fruited for 10 years. Vine very vigorous and productive, wood short-jointed, leaves medium sized, lobed, thick, and overlap; bunch very large, long, compact, shouldered; berry large, oval, purplish-black, with thick gray bloom, flesh tender, juicy, sweet, rather rich, very good. A promising market grape.

No. 11.—Hartford and Muscat. Strong grower, leaf hardy and healthy; bunch medium, shouldered; berry above medium, round, pale yellow, sweet, pulp soft, good.

PLANET.—Concord and Black Muscat of Alexandria. Healthy and productive; bunch large, loose, shouldered; berry large, intermixed with some smaller ones, which have no seed, oblong, very tender pulp, juicy, sweet, fine flavor, slight taste of the Muscat.

No. 502.—Hartford and Iona. Leaf healthy; bunch compact, heavy; berry medium, black, with blue bloom, leathery, resembling Creveling in taste.

No. 250.—Ives and Catawba. Strong grower, healthy leaf; bunch heavy, shouldered, compact; berry above medium, round, black, blue bloom; skin tough, fair quality, very handsome, would be a splendid shipping grape.

No. 331.—Concord and Herbemont. Foliage resembling Concord, healthy, and hardy; bunch medium, compact, shouldered; berry below medium, round, juicy, rather pulpy, makes a fine, red wine, with a slight almond taste.

These are the most promising of the numerous seedlings of the *Labrusca* and its hybrids which Mr. Ricketts has originated. He has also a number of *cordifolia* seed-

lings, which are highly promising, and to which I will refer when I describe that class.

Mr. Jacob Madinger, of St. Joseph, Mo., has several Concord seedlings, which may be valuable as showy and handsome market grapes of good quality. I have only seen some dilapidated bunches, too ripe, and roughly handled; the berries are much larger than Concord, and seem to be of very fair quality.

STORM KING.—Originated by Mr. E. P. Roe, Cornwall-on-the-Hudson, N. Y. Seems to be an accidental sport of a Concord vine, which, as he says, has borne the same mammoth fruit for twelve years. Bunch large and heavy, shouldered; berry resembling Concord, but nearly twice as large, black, round, with very little foxiness; juicy, and good.

COTTAGE.—By Mr. Bull, the originator of the Concord. This is very promising, seems to be a strong grower, earlier than its parent, and of much better quality. I hope to see more of it next season.

The following are said to be of good quality, but are not sufficiently known to me to venture an opinion upon their merits: Cambridge, Challenge, Clover Street Red and Black, Columbia, Concord Chasselas, Concord Muscat, Conqueror, Dana, Detroit, Eureka, Flora, Gaertner, Herbert, Irving, Ithaca, Pollock, Rogers' 5, Senasqua.

The following I consider worthless, and think they should be discarded, as we can certainly grow better, or more healthy sorts. Some are of good quality, but tender or unproductive and unhealthy: Adirondack, Alexander, Agawam, Albino, Allen's Hybrid, Amanda, Anna, Arrott, August Pioneer, Berks, Bland, Blood's Black, Blue Imperial, Burton's Early, Camden, Canby's August, Cassady, Charter Oak, Clara, Macedonia, Cowan, Croton, Diana, Diana Hamburg, Dracut Amber, Early Hudson, Elizabeth, Framingham, Graham, Hart-

ford, Hettie, Howell, Iona, Isabella, Israella, Kingsessing, Labe, Logan, Lydia, Lyman, Creveling, Maguire, Mary, Maxatawney, Merrimac, Miles, Venango, Mount Lebanon, Mottled, Neff, North America, Northern Muscadine, North Carolina, Rebecca, Seneca, St. Catherine, Walter.

CHAPTER X.

THE ÆSTIVALIS CLASS.—FOR GENERAL CULTIVATION.

CYNTHIANA.—Synonym, Red River. This most valuable grape was obtained by me from Wm. R. Prince, who had it from Arkansas, and introduced it into Missouri about 1858. It resembled the Norton so much in growth and foliage, that I supposed it to be identical with it, until it bore fruit, and more especially when I made wine from it, when the difference became very apparent. This seeming identity has prevented its dissemination, as many still believe it to be the same, but the bunch is generally heavier, with broader shoulders, the berry somewhat larger, sweeter, and less astringent, and the wine is not quite as dark, less rough and astringent, without that coffee-like taste of the Norton, and much more spicy and delicate, resembling the best Burgundy. Those who have tasted good Cynthiana wine once, will not easily forget it; and the fact that, besides the innumerable premiums awarded in this country, it was awarded the first premium as "best red wine of all nations," at the Vienna Exposition, should speak volumes in its praise, and warrant the belief, so often expressed by me, that it will become one of the staples of the country, and can not be excelled anywhere. Bunch medium, compact, shouldered; berry below medium, black, with blue bloom,

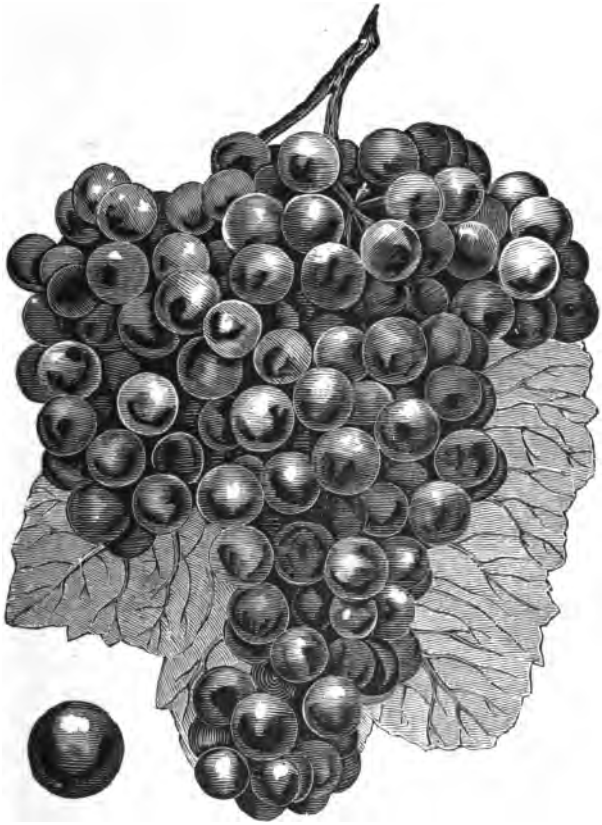


Fig. 11.—CYNTHIANA. (55)

LIBRARY
OF THE
UNIVERSITY
OF CALIFORNIA.

sweet, and vinous, with dark-red juice, moderately juicy, very rich. Specific gravity of must 118°. Vine a good grower, healthy, and hardy, but does not grow readily from cuttings, and will not bear much before the third year, when it becomes very productive; not liable to any disease, and one of the surest we have; will bear best on spurs on old wood, like the Norton's.

NORTON'S VIRGINIA.—Synonyms, Norton's Seedling, Virginia Seedling. Introduced by Dr. Norton, of Virginia, who found it on an island in the Potomac. Introduced into Missouri in 1850. It caused a revolution in grape culture here, as its merits as a uniformly reliable grape for red wine became fully known. There is, perhaps, no other grape which has given such uniform satisfaction as this, and although I have warmly praised and recommended it from the first, I have seen no reason to retract a single word which I have said in its favor. It seems to succeed everywhere, though its products, of course, differ, and I had occasion to admire a splendid exhibition of it at the Centennial, from Egg Harbor City, New Jersey, where I first saw it, and had occasion to try its wine. As made there, it has not the heavy character of our Missouri Norton's, but is a very good Claret. Bunch and berry smaller than Cynthiana, and not so heavily shouldered; berry small, black, with blue bloom, with a very dark-colored, astringent juice, though sweet and very spicy when fully ripe. Specific gravity of must 110°. Makes, perhaps, the best medicinal wine in the country; it has already saved thousands of lives, especially of children suffering with summer complaint, and acquired a world-wide reputation. Even as a table grape, many prefer it on account of its spicy character, and its plump bunches will keep like winter apples. Perfectly free from Phylloxera and other diseases; a strong and healthy grower; bears best on spurs on old arms. As it starts late in spring, it is also not liable to spring frosts.

HERBEMONT.—Synonyms, Warren, Warrenton, Herbemont's Maderia. A specifically *Southern* grape, for which we in Missouri are too far north, but where it is in its proper latitude, one of the very best. Bunch large and heavy, compact, shouldered; berry below medium, black, with blue bloom; skin thin, no pulp, but its berries are filled with the most spicy and refreshing juice, which that nice discriminator of fruits, the late A. J. Downing, called "bags of wine." Fine for the table, and when pressed immediately, makes an exquisite *white* wine; if allowed to ferment on the husks, a pale red wine, somewhat resembling Madeira. Should be planted on southern locations, in rather poor soil, which is naturally well drained; it is useless to plant it on rich soils, or those retentive of moisture, as it will grow too rampant, and not ripen its wood. My friend, Onderdonk, of Victoria, Texas, writes to me, that it is the best and most successful grape they cultivate, and it has for several years been largely imported into France, as its roots are Phylloxera proof, and it succeeds splendidly there. Ripens rather late, and is somewhat tender even here. It promises to make the foundation of a race of true *wine* grapes, and if we can obtain seedlings of it, with all the good qualities of the parent, but somewhat earlier and more hardy, they will be all that can be desired. Mr. Onderdonk already reports one seedling, the Harvard, in all respects similar to the Herbemont, but double the size, and may become exceedingly valuable. The Herbemont is a strong and very beautiful grower, very productive, but somewhat subject to a peculiar kind of dry rot. Leaves large and thin, light green, deeply lobed. Specific gravity of must 85°.

Fig. 12.—HERBEMONT.

CHAPTER XI.

THE ÆSTIVALIS CLASS.—VARIETIES PROMISING WELL.

CUNNINGHAM.—Synonym, Long. Much like the foregoing in bunch and berry, belonging to the southern branch of the *æstivalis* class. Bunch very compact, heavy-shouldered; berry smaller than Herbemont, brownish red, with blue bloom; skin tougher and thicker, ripening about the same time. Not so good for the table, but will make a very heavy wine of a Sherry character, while the Herbemout is more like Rhenish wine. The must is very rich in sugar, but also in acid, and the grape very high flavored. A very strong, short-jointed, late grower, ripening not even as well as the Herbemont, and should, therefore, be cultivated only in the South. It succeeds splendidly in France, and is very highly esteemed there for its fruit, as well as its total resistance to Phylloxera. It has heart-shaped leaves, not lobed. Specific gravity of must 110°.

LENOIR.—Synonyms, Devereaux, Black Spanish, Jacques, Jack Grape. There has been a great deal of confusion about this grape, and it has even been confounded with the Ohio, or Cigar Box, but I think the above is its true name. It is the same which the French have cultivated as Black Spanish, or Jacques, and value so highly, owing to its success in France; its entire freedom from Phylloxera, and the excellent red wine it makes. I have been thoroughly sifting the question of its identity, and Mr. Onderdonk, who says it is the best grape they grow in Texas, next to the Herbemont, has been indefatigable in his exertions to help me clear up this matter. It is even more southern in its character than the two foregoing. Bunch very long, loose, shoul-

dered; berry small, black, with blue bloom; skin as thin as Herbemont, no pulp, juice very dark red, sweet, and rich, making a splendid deep red wine of exquisite flavor. Specific gravity of must 110°. I have cultivated the vine for a number of years, but had to abandon it, as it evidently is too far north here; in the South it must be very desirable. Vine a strong, rather long-jointed grower, wood brown, leaves very thin, bright green, deeply lobed.

HERMANN.—A seedling of the Norton, grown by Mr. Francis Langendoerfer, Hermann, Mo. Bunch long, shouldered, moderately compact; berry smaller than Norton's, black, with blue bloom, not very juicy, but very high flavored, juice not so dark, and will make a fine golden Sherry wine, if properly handled. It ripens later than Norton's, and as it is a strong grower and very productive, is certainly worthy of extensive trial here and further south. Specific gravity of must 110°. Mr. Langendoerfer has grown a white seedling of it, resembling the parent in berry and bunch, but of a transparent, golden color, of which I have tried the wine, and must pronounce it the most exquisite wine I ever tasted, of a pale yellow color, with the Hermann flavor trebly refined. He also has a white Norton's Seedling, which also makes fine wine, and as these two are the first white *æstivalis* yet produced, they promise a new departure in another direction from this valuable class. Very productive, healthy, and hardy at Sedalia last season.

RULANDER.—This is not the German grape of this name, but also one of the southern *æstivalis* class. It also makes a very fine wine, of a Sherry character, but has, of late, become rather unproductive. Bunch small, compact, shouldered; berry small, brownish black, with blue bloom, very sweet, and high flavored. Specific gravity of must 112°. It is a stocky, short-jointed

grower, with grayish wood, heart-shaped, shining leaves, and sometimes very productive, but rather fickle and variable. The same may be said of the Louisiana, which so closely resembles it that it has been confounded with it, but the wine of the Louisiana resembles a very fine Hock, while the Rulander has a Sherry character.

ALVEY, OR HAGAR.—An exquisite little grape, the earliest of that class; so good that the birds will generally take it all. Bunch medium, shouldered, loose; berry small, shining black; skin thin, very juicy, sweet and luscious, one of the best in quality I know, and makes a fine red wine. Specific gravity of must 90°. A stocky, short-jointed grower, with heart-shaped leaves, and about the only one of its class which propagates readily from cuttings.

LINCOLN.—This I suppose to be identical with Black July. Mr. Phifer, of Concord, North Carolina, where it is considerably cultivated, gives it very high praise, as being productive and healthy, and making a fine, high-flavored, light-red wine. I have grafts of it growing; it has heart-shaped leaves, and seems to be a good healthy grower.

BALDWIN LENOIR.—Mr. Saunders, Supt. of Public Grounds, at Washington, thinks very highly of this, and as it has fruited for me last year, I can also testify to its good quality. The vine resembles the Norton, in wood and leaf. Bunch small, very compact, shouldered; berry small, round, black, with blue bloom, also resembling Norton, but to my taste sweeter, more juicy, and high flavored. I have no doubt it will make a first class red wine, and should it prove as productive as the Norton and Cynthiana, will be very valuable.

NEOSHO.—This is a wild grape from the woods, cultivated by Mr. Hermann Jaeger, of Neosho, Mo. That veteran in grape culture, Fr. Muench, of Warren Co.,

Mo., thinks this one of the best grapes he cultivates. It is a strong, rampant grower, very productive, but like all of its class, very difficult to propagate. Bunch heavy, compact, shouldered; berry below medium, purplish-black, with blue bloom, not very juicy; the juice is of a much lighter red than that of the Norton, and has a different flavor, more resembling Sherry. There has been some confusion between this and the Racine, of same origin, but I think the Neosho much more valuable than Racine.

FAR WEST. — Mr. Muench also speaks very highly of this variety, which comes from the same neighborhood, and I place great confidence in his judgment.

Mr. Jaeger recently sent me a box of eight varieties of grapes, and although I tested them nearly three weeks after they had been sent, I was surprised to find, even after so long a time, such evidences of decided merit. I give descriptions of them as they appeared to me then, and have no doubt that, under the circumstances, it falls far short of what they are when fresh from the vine. As they all come from the same stock, the wild *æstivalis*, they show perhaps as much improvement as those of any other class.

JAEGER'S No. 9.—Bunch compact, shouldered; berry below medium, round, black, with blue bloom, fine flavor, sweet, and good. Promising for wine.

JAEGER'S No. 13.—Bunch large and heavy, compact, shouldered; berry medium, black, pulpy, dark juice, good flavor. Promising for red wine.

JAEGER'S No. 22.—Bunch very heavy, large, and long, compact; berry about size of Catawba, round, deep purple, sweet, and good. Not as dark a juice as 9 and 13.

JAEGER'S No. 32.—Very similar to Norton's, but exceedingly sweet; must make a very heavy, dark colored wine.

RACINE.—The least valuable, very sweet, but small berry, very pulpy, and full of seeds.

NEOSHO.—Larger bunch and berry than Racine, more juicy, fine flavor, bunch and berry larger than Norton's, lighter colored juice.

WHITE NORTON.—Originated with F. Langendoerfer, near Hermann, Mo. Bunch and berry resembling Norton in size, but white; sweet, fine flavor, and very juicy.

BALSIGER'S WHITE NORTON.—Berry larger than the preceding, more juicy, fine flavor, resembling Elvira somewhat, very good.

Discarded Varieties.—Baxter, Ohio, Pauline, Raabe. These are either too unhealthy, or of too poor quality to be worthy of cultivation.

CHAPTER XII.

CORDIFOLIA CLASS (or RIPARIA, according to Engelmann).

This class, so far only represented by varieties of either indifferent quality, such as Clinton, Anghwick, Blue Dyer, Burroughs, Franklin, Huntingdon, Kitchen, Newark, Marion, Oporto, or such as are rather unproductive or subject to disease, as the Autuchon, Brant, Canada, Cornucopia, Golden Clinton, and Taylor, also has taken a new departure, with the seedlings from Taylor, raised by Mr. Jacob Rommel, and now promises to furnish us the leading white wine grapes of the country, and likewise valuable market grapes. Had their originator produced nothing but the Elvira, he would be remembered by generations to come, but he is confident that he can still

surpass it in quality, if not in productiveness and hardiness, for the latter would be impossible. Guided by the idea that the Taylor need only be improved in size and productiveness, as its wine was good enough, he sowed the seed of the best Taylor grapes he could find, and now, after nine years of trial with the Elvira, in which it has never missed an abundant crop, and after careful tests of the wine, I do not hesitate to call it the most useful, and in that sense, the best white grape we have, and were I restricted to one variety only, would unhesitatingly choose this. As it is not near as well known as it deserves to be, I will give a full description of it, and I think I can do the grape-growers of our country no greater service, than in prevailing upon them all to try it.

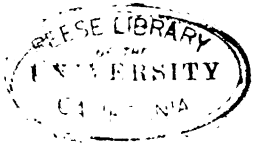
ELVIRA. — Originated with Mr. Jacob Rommel, of Morrison, Mo., from seed of the Taylor, and fruited first in 1869, but has since improved every year in size of bunch and berry, until, from a very small berry, with small but compact bunch, it has now become as large as Catawba in berry, and almost as large in bunch. Every one should plant it for the following seven reasons:

1. Its extreme hardiness. It has withstood the extremely cold winters of 1872–'73 and 1874–'75, without the slightest injury; when even the Concord suffered more or less everywhere throughout the State, the Elvira produced a full crop.

2. Its freedom from disease. It has proved singularly healthy and produced full crops for ten years in succession; when nearly all varieties rotted badly (except Ives, Norton's, Cynthiana, and some other seedlings of Mr. Rommel, of whom I shall speak hereafter), the Elvira produced a full crop, averaging, in Mr. Rommel's vineyard, from 20 to 25 lbs. to the vine.

3. Its immense productiveness. All the fruit-bearing branches produce from four to six bunches, and a piece

Fig. 13.—ELVIRA.


LIBRARY
UNIVERSITY

of a bearing cane with clusters about a foot long, weighed eight pounds.

4. Its handsome and vigorous growth. It is a stocky, short-jointed grower, not rambling, like the Taylor and Clinton, but a perfect picture of a vine, having thick, light green and abundant foliage, with pale gray, short-jointed wood, and is, therefore, well adapted to vineyard and arbor culture.

5. Its handsome bunch and berry. This has improved very much since it first fruited, and may still improve. Bunch medium, shouldered, very compact; berry about the size of the Catawba, round, light green in the shade, pale yellow where more exposed, transparent; skin, thin, pulp tender, very juicy and sweet; flavor fine, pure, without foxiness, ripening a few days later than Concord.

6. Its fine quality for wine. The must of the Elvira is about as heavy as good Catawba, if well ripened. Specific gravity 85°. Makes a beautiful greenish-yellow wine, without foxiness, and a delicate and full aroma, resembling Riesling. In this respect it will satisfy even the most fastidious fancier of Rhenish wines, and as it can be produced cheaply, we shall have in it what we have been seeking so long, a true wine grape within the reach of all.

7. Easy propagation. It grows readily from cuttings, and being a Taylor seedling, is likely to be Phylloxera proof, and remain healthy.

We are, however, in justice, compelled to say, that it has one fault, which has proved a serious drawback to it in the East during the season of 1879. The bunch is so compact, that the berries crowd each other, and being very thin skinned, they are liable to crack after a drouth, succeeded by a shower of rain. Otherwise, it has proved a complete success, even at the East.

CHAPTER XIII.

THE CORDIFOLIA CLASS.—VARIETIES PROMISING WELL.

The following are sisters of the Elvira, and may surpass it in quality, but have not been so long and generally tried; moreover Mr. Rommel does not intend to send them out immediately, if at all, for he says: "They shall prove best in every respect, or not go out at all, as the public have already varieties enough, even too many, unless we can add to the number something much better than we already have. There shall be no humbug in my grapes." They have fruited six years now, and I also have them fruiting this summer, in an entirely different locality; two seasons of further trial will fully show what they are. No one need apply, either to him or me, for any vines or wood until some months yet.

No. 5. TRANSPARENT.—(Taylor seedling). Bunch medium, somewhat larger than the largest Taylor, and has increased in size already, compact, and shouldered; berry about same size as Taylor, round, pale yellow, transparent, so that the seeds can be seen, with gray dots, no pulp, skin thin, very juicy, sweet, and of fine flavor. This has always set its fruit perfectly, and as its must contains a large amount of saccharine matter, will make a wine which has hardly had its equal yet. Vine a strong and rather long-jointed grower, resembling its parent in leaf and growth.

No. 8. AMBER.—(Taylor seedling). Bunch large, shouldered, moderately compact; berry medium, oblong, pale amber when fully ripe, sweet, juicy; pulp very tender; skin thin, very fine flavor. Ripens about the same time as Catawba, very productive so far, and entirely hardy and healthy. An exquisite table grape, combining fine quality with attractive appearance, though its skin

Fig. 14.—AMBER.

REESE LIBRARY

may be too tender to ship to distant markets. It will, no doubt, also make a very fine white wine. A strong grower, dark brown wood, large and healthy leaves.

No. 10. PEARL.—(Taylor seedling). Bunch heavy, larger than Elvira, compact, shouldered; berry full medium, round, pale yellow, covered with a delicate bloom; skin thin and transparent; pulp soft and melting, juicy, sweet, and high flavored; of great promise both as a table and wine grape; very productive and healthy so far. Ripens a few days later than Concord. Vine a strong healthy grower, large, bright green leaves, and grayish wood.

Mr. R. has a great number of other seedlings. One, a Delaware seedling, black, which ripens four or five days before the Hartford, and may become valuable as an early market grape, as it is of good quality. No. 12, much resembling Elvira, may also be valuable.

No. 20.—A black Taylor seedling, with a peculiar plum-like consistency and flavor, very agreeable. Another accidental seedling which Mrs. Rommell found and saved, is the most delicate berry I ever saw, with a skin as thin and transparent as cobwebs, pale green, no pulp, and very sweet; flavor, pure. So far the bunch is very loose, though it sets an immense number of them. Mr. Rommel made some wine of it this fall, which he thinks the finest he has yet tasted. Should the bunch improve, it may become one of our most valuable wine grapes.

No. 14. —A black Taylor seedling, which promises very highly for red wine. A seedling of the Elvira, which he thinks far superior to its parent, has fruited but once, and shows evidences of great merit.

UHLAND.—This is another Taylor seedling, highly promising for white wine, grown by Mr. Wm. Weydemeyer, at Hermann. It makes a heavier and higher flavored wine than Elvira, but the leaf is hardly so heavy

and healthy, suffering more from sun scald. Bunch medium, compact, shouldered; berry medium, pale yellow in the shade, pale amber in the sun, slightly oblong; skin thin, transparent; juicy, and high flavored. Very productive and hardy, and generally healthy. Vine a strong, somewhat long-jointed grower, wood grayish, leaf resembling Taylor. Specific gravity of must 95°. Has fruited for four or five years, and the wine is highly praised by connoisseurs, as resembling heavy Rhenish wine.

MISSOURI RIESLING.—This was originated by Mr. Nicolas Grein, of Gasconade Co., Mo. It is evidently a Taylor seedling, and has proved very hardy, healthy, and productive wherever tried. Vine vigorous and very healthy; leaves thick and healthy; a short-jointed grower, very productive. Bunch medium, moderately compact, shouldered; berry rather below medium, round, greenish-white, juicy, and free from pulp; fine quality; said to make an exquisite white wine.

NOAH.—Originated by Edward Wasserzieher, Nauvoo, Ill., from seed of the Taylor. Bunch medium, shouldered, moderately compact; berry medium, round, pale yellow, with white bloom; very sweet, but rather hard pulp, good flavor; said to be very productive and hardy.

The following are Clinton seedlings, grown by Mr. James H. Ricketts, of Newburgh, N. Y.:

PIZARRO.—Seedling of Clinton and a foreign grape, foliage resembling Clinton, productive; bunch long, rather loose; berry medium, oblong, black, very juicy and spicy; promising for wine. A sample of wine made from it was of light red color, with very fine aroma.

BACCHUS.—Very healthy, and enormously productive, as the original vine bore about 1,000 bunches this season, all perfect. In 1877, the same vine yielded nine gallons and a quart of juice; a seedling of Clinton, which it re-

sembles in leaf, bunch, and berry, but is much better. Bunch medium, compact, shouldered; berry below medium, black, with blue bloom; juicy, and sprightly. The must weighs from 95° to 110°. Some wine from it which I tasted, was brownish-red, sprightly, very heavy, and of fine flavor.

ARIADNE.—Clinton seedling; promising for wine, but so overloaded that it could hardly be called a fair test; bunch compact, resembling Clinton, but very much better, very juicy and sweet; juice dark. Some wine I tasted was light-red, very heavy, with fine flavor.

NAOMI.—Vine vigorous, very productive, a hybrid of Clinton and one of the Muscats, fruited ten years, leaves very large, coarsely serrated. Bunch very large, shouldered; berry medium, roundish oval, pale green, often with a tinge of red in the sun, covered with white bloom; flesh juicy, melting, sweet, and sprightly; ripens with the Concord.

No. 234.—A white grape, with foliage like Clinton; makes a very fine, deep yellow wine with a slight Sherry flavor.

No. 231.—Clinton hybridized with foreign. Vine productive; makes a straw-colored wine, somewhat sweet; must 104°, fine flavor.

No. 413.—A seedling of Bacchus. Vine vigorous and healthy. Bunch medium, compact, seldom shouldered; berry medium, black, with blue bloom, spicy, and very sweet; promising for light-red wine, and as a good table grape.

These are the most promising of Mr. Ricketts' grapes that I saw. He has a multitude of others, all fine, but either not healthy enough, or not good enough in quality, to compare with these. How they will do in other sections and on other soil remains to be proved, but at his place they certainly are very fine.

The success of Mr. Ricketts in producing quality, at least, from the Clinton, has been as marked as that of Mr. Rommel, and should some of his seedlings prove generally successful, the Clinton may become the progenitor of as valuable a class of red, as the Taylor of white wines. Some of the samples I tested with him, were very fine indeed, and entirely distinct from anything tasted by me before, while all show extraordinary keeping qualities. Taking into consideration the small quantities in which these wines were made, and all the disadvantages under which he labored in producing them, they were something remarkable indeed. I have already referred to the varieties which I think ought to be discarded, now that we have so many better ones, but we ought to hold the Taylor and Clinton in grateful remembrance, for the offspring they have given us, and as nearly all of them seem to have Phylloxera-proof roots, we may look to the *æstivalis* and *cordifolia* as likely to become the foundation of the new era of viticulture for the whole civilized world. California, which seems to be the home *par excellence* of the *vinifera*, is now importing our *cordifolia* and *æstivalis* varieties. Her vineyards are threatened by as wide-spread a devastation as those of France, and as the *cordifolia* has the advantage of easy propagation and rank growth over the *æstivalis*, which is difficult to propagate, we may naturally suppose that this class will take the lead. Verily, this country has seen great changes within the last ten years, and in none of the fruits have these been more marked than in the grape.

CHAPTER XIV.

VARIETIES DIFFICULT TO CLASSIFY, ETC.

I think that the following may be crosses between the *æstivalis* and *vinifera*, as they are distinct from all others, possessing some of the characteristics of both these classes, and are very subject to the attacks of Phylloxera.

CREVELING.—Synonyms, Catawissa Bloom, Columbia County, Bloomsburg, Laura Beverly. Vine hardy, a moderate grower and bearer, with thin, deeply-lobed leaves: Bunch medium, shouldered, loose; berry medium, round, black, with blue bloom, nearly as early as Hartford, sweet, and good, carries well to market, but is apt to set imperfectly. Supposed to have originated in Pennsylvania; not desirable in most sections.

DELAWARE.—Synonyms, Heath, Italian Wine, German Grape, Traminer (*erroneously*). Downing says: "It was found many years ago in the garden of Paul H. Prevost, Frenchtown, Hunterdon Co., N. J." It may be a hybrid of *vinifera* and *æstivalis*, but is certainly not the Traminer of Germany, as was claimed by some. It was introduced by Mr. Thompson, of Delaware, Ohio, and extensively propagated and unduly praised by Dr. Grant, of Iona Island, New York, who urged it for general cultivation through the country. The sequel has shown how little it was adapted to general culture. It seems to do very well in certain localities East and North, and where it does, it is certainly a nice little grape, sweet and luscious for the table, and makes a fine wine. In the West and South it has not generally given much satisfaction, as its leaf seems too tender to withstand our hot suns and sudden changes. It is also very subject to Phylloxera, almost as much so as a *vinifera*, but could, perhaps, be improved by grafting on healthy and hardy

stocks. It needs a rich, sandy soil, and close pruning, as it is exceedingly productive, apt to overbear and then drop its leaves. Bunch below medium, compact, shouldered; berry below medium, oblong, pale red, with beautiful lilac bloom; skin not thick, but tough, very sweet, high flavored, and juicy. Ripens before the Concord. Specific gravity of must 100°.

PURITY.—I think I must also place Mr. Campbell's little grape in this class, as it is very evidently a seedling of Delaware. I saw it, for the first time, at the Centennial, and as he says it is hardy, healthy, and productive, it may become a valuable wine grape. I think it well named. Bunch small, rather loose, shouldered; berry below medium, pale yellow, transparent, sweet, and juicy, with no trace of foxiness or native flavor discernible. I have no doubt it would make a delightful wine.

VITIS VULPINA, THE SCUPPERNONG.

It may be expected that I shall say something about this class, of which some of our Southern readers expect so much. I will simply observe that I have tried to cultivate, and once fruited the Scuppernong, or Southern Muscadine, but found it entirely useless, and all the correspondence I have had with Southern grape-growers has led me to the belief that we cannot expect real *grapes*, worthy of the name, from that class, nor from the Mustang of Texas. The Scuppernong and its varieties differ entirely, in all their habits, from all other grapes. The fruit drops as soon as ripe, is deficient in sugar, has a very tough pulp, and strong flavor. I venture to assert, that another decade will see these grapes dropped from the roll altogether.

I do not write for our friends on the Pacific coast. They have so far cultivated mainly the *vinifera*, and have a different climate and soil, so it would be preposterous

for me to try and give them advice. I will say this much, however, that I have tried a great many wines of their make, and although there is a vast improvement perceptible lately in the quality of their products, yet they are all too heavy to suit the palate of the true connoisseur in wines. It is an old established fact, that the true bouquet wines are only grown in the temperate zones, and there is a certain amount of acid necessary in the must to develop bouquet in fermentation. Moreover, the Phylloxera is busy at work there, and I fully believe, from all the knowledge I can gain of the habits of that little devastator, that they will be compelled to resort to our *æstivalis* and *cordifolia* varieties, to regenerate their failing vineyards, as we have already seen it done in France. The day may not be so far distant, when the despised grape of North America will become the only hope of the failing grape-growers of all nations. Let us then do our best to furnish such material as will be an honor to the country, and carry the fame of the "Wineland" of the old legend through the length and breadth of the earth.

CHAPTER XV.

VARIETIES FOR DIFFERENT LOCALITIES.

I will now try to give a list of varieties for table and market and one for wine, for the three sections of country, Eastern and North-Eastern States, Middle and Western States, and Southern States. I do not pretend that it should be a complete guide, for great allowance must always be made for soil and location, and no one a thousand miles away can give so good advice to a novice, as he can gather in the nearest vineyards by actual observation, provided he can consult any of his neighbors.

VARIETIES FOR NORTH OF LATITUDE 42°.

MOST HARDY AND PRODUCTIVE FOR TABLE AND MARKET.—Perkins, Massasoit, Wilder, Delaware, Martha, Concord, Elvira, Lindley, Telegraph.

Promising Well.—Lady, Early Champion, Aminia, Essex, Black Eagle, Amber, Pearl, Beauty, Brighton.

FOR WINE.—*General Cultivation.*—Delaware, Elvira, for white wine; Cynthiana, and Norton's Virginia, for red wine.

Promising Well.—Martha, Massasoit, for white wine.

VARIETIES FOR LOCALITIES BETWEEN LATITUDE 42°—36°.

FOR TABLE AND MARKET.—Perkins, Massasoit, Wilder, Telegraph, Concord, Martha, Elvira, Gœthe, Lindley.

Promising Well.—Lady, Aminia, Black Eagle, Defiance, Essex, Pearl, Amber, Beauty, Triumph.

FOR WHITE WINE.—Elvira, Martha, Gœthe.

Promising Well.—Pearl, Amber, Beauty, Uhland, Transparent.

FOR RED WINE.—Cynthiana, Norton's Virginia.

FOR SHERRY.—Hermann.

Promising Well.—Hermann Seedling.

This list embraces only the older varieties, such as have been tried several years.

VARIETIES FOR LOCALITIES SOUTH OF 36°.

FOR MARKET AND TABLE.—Perkins, Massasoit, Wilder, Martha, Elvira, Gœthe, Lindley, Herbemont.

Promising Well.—Lady, Black Eagle, Defiance, Triumph, Rogers' No. 2.

FOR WHITE WINE.—Elvira, Herbemont.

Promising Well.—Amber, Pearl, Beauty, Transparent, Uhland, Hermann Seedling.

REESE LIBRARY OF THE UNIVERSITY CALIFORNIA

FOR RED WINE.—Cynthiana, Norton's Virginia, Lenoir.

FOR SHERRY.—Hermann, Rulander, Cunningham, Alvey.

CHAPTER XVI.

PLANTING THE VINE.

The distance at which the vines may be planted, will, of course, vary with the different varieties. The rows may all be 6 feet apart, as this is the most convenient distance for cultivating, and gives space enough for man, horse and plow, or cultivator. Slow growing varieties, such as Delaware, Catawba, or Alvey, may be planted 6 feet apart in the rows, but Concord, Norton's, Herbemont, and all strong growing varieties, will need more room, say from 8 to 10 feet, to give the vines ample space to spread, and allow free circulation of air, one of the first conditions of success. The next question is: Shall we plant cuttings or rooted plants? The latter are by far the best, as cuttings, even of the easiest growing varieties, are uncertain, and we cannot expect to have so even a growth as from rooted plants carefully assorted. Choose, therefore, good, strong, one-year-old plants, the best you can get, either from cuttings, layers, or single eyes. Good plants should have plenty of strong, well-ripened roots, which are smooth and firm—for excrescences and warts upon the roots are a sign of Phylloxera—and have also well-ripened, short-jointed wood. They should be of even size, so as to make a uniform growth, and not have been forced by the propagator into rank growth, for we cannot expect plants that have been petted and pampered with artificial manures, to flourish with

the every day food they obtain in the vineyard. But do not take second or third-rate plants, if you can help it, for they will not make the thrifty growth of first-class plants. The best are the cheapest even if they cost a little more. Especially important is this with such varieties as Norton's or Delaware, which do not root readily, and are always more difficult to transplant. Better pay double the price for them and get good plants, as they will make healthier vines and bear sooner.

But I also caution you against those who would sell you "extra large layers for immediate bearing," and whose plants are "better than any one else grows them," as their advertisements will term it. It is time that this humbug should cease, and the public in general should know that they cannot, in reason, expect fruit from a vine transplanted the same season, and that those who pretend it can be done without vital injury to the plant, are only seeking to fill their pockets at the cost of their customers. They know well enough themselves, that it cannot be done without fatally injuring the plant, but they impose upon the credulity of their customers; sell them large vines at extravagant prices, which these good souls will buy, and perhaps obtain a few sickly bunches the first season, but if they do, the vines will make a feeble growth, not ripen their wood, and be winter-killed next season. Therefore, if you look around for plants do not go to those who advertise "layers for immediate bearing," or "better grown than any one's else," but send to some honest, reliable nurseryman whom you can trust; one who is not afraid to let you see how he grows them, and let him send you a sample of his plants. Choose good, strong, healthy plants, one year old, plant carefully, and be content to wait two years for results; but then, if you have cultivated the vines carefully, you will get a crop of grapes that is worth gathering. You can not, in nature and reason, expect it sooner.

If the ground has been prepared in the fall, so much the better, and if it has been thrown into ridges, and is dry enough, it may be planted in the fall. The advantages of fall planting may be summed up as follows: The

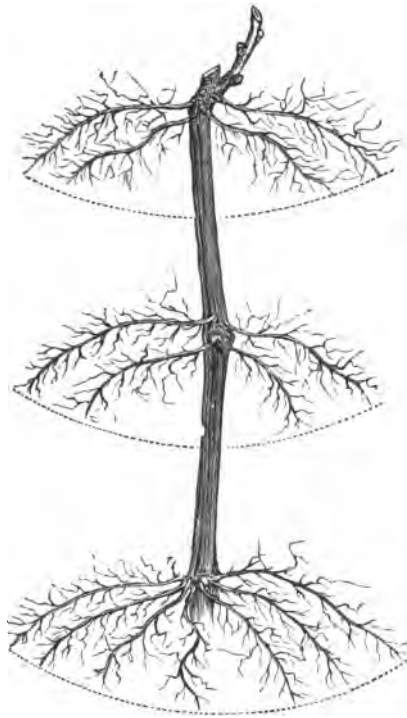


Fig. 15.—YOUNG VINE READY TO PLANT.

ground is generally in better condition than in spring and will work better, as we usually have better weather, and more time to spare; the ground can settle among the roots, which will be healed over and callused by spring, when the plant is ready to start with full vigor.

Mark your ground, laying it off with a line, and put a small stake where each plant is to be. A very conveni-

ent plan is to tie a string, or piece of bark, into your line at the proper distance for each plant, then you have an even measure every time. Dig a hole, 8 or 10 inches deep, as shown in figure 16, in a slanting direction, raising a small mound of well pulverized earth in the center; then, having pruned your plant, as in figure 15, with its tops and roots shortened-in, as shown by the dotted lines, lay it in, resting the lower end on the mound of earth; spread out its roots evenly to all sides, and then fill in with well pulverized earth, leaving the upper bud above the ground. When planted in fall, raise a small mound around each vine, so as to drain off the water, and throw a handful of mulch on top of the vines, to protect them. All the work should be done when the ground is in good condition, and dry and mellow enough to be worked in well among the roots.

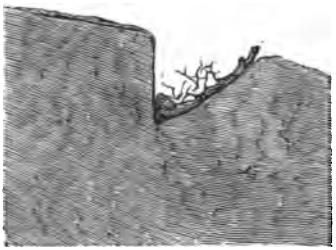


Fig. 16.—PLANTING THE VINE.

CHAPTER XVII.

TREATMENT OF THE VINE THE FIRST SUMMER.

The first summer after planting, nothing is necessary but to keep the ground loose and mellow and free from weeds, stirring it freely with hoe, rake, and plow, whenever necessary, but never when the ground is wet. Should the vines grow strong, they may be tied to the small stakes, to elevate them somewhat above the ground. Allow but one shoot to grow, rubbing off all others as

they appear, but allow all the laterals to grow on this shoot, as it will make it short-jointed and stocky.

In the fall, prune the young vine back to three buds, if it has grown well; to one or two, if it is small. A fair growth for the first season, is from 3 to 4 feet. During the winter, trellises should be provided, as this is the most convenient and the cheapest method of training; and we expect our vines to grow from 10 to 15 feet the coming summer. Procure good posts, 7 feet long, and 3 to 4 inches in diameter, of Red Cedar where it can be had, as this is the most durable; if that is not at hand, use Osage Orange, Mulberry, Black Locust, or Post Oak. Char the lower ends of the posts slightly, or dip them in coal tar, as far as they go into the ground, to make them more durable. Make holes with a post auger, placing the first post in each row about 4 feet outside of the last vine, and parallel with the row; set the second post midway between the second and third vines, and so on, so that two vines always occupy the space between two posts. If preferred, every other post can be omitted this summer, and the intermediate ones may be set the next fall, as the trellis will be strong enough to bear the young growth, and that is all it will have to do the next summer. Make the holes 2 feet deep and set the posts firmly, pounding down the ground around them with a small wooden pestle or crowbar. Brace the end post firmly, by driving in a short stake 4 feet from the last post, fastening a wire to the top of the post and drawing it down and around the stake, as shown in figure 17. Procure No. 12 wire; bore holes with a half-inch auger through the end post (which should always be rather heavier and square), one near the top of the post, and one or two others, as you wish to make the trellis of two or three wires. If the trellis is to be of only two wires, make the next hole 2 feet below the upper one; if three wires are to be used, 20 inches below. The three-wire

trellis is somewhat more convenient in tying up the young vines and lower canes, but is also costlier, while the two-wire trellis is more economical, and when the vines are once established in their proper shape, just as good, while it is more convenient for cultivation below, and allows freer circulation of air below the bearing canes. Fasten your vine to the post at one end, drawing it along the line, and pass it through the hole in the end post. Have pieces of 1 inch boards, $1^1/_2$ inch broad, and a foot long, with a hole bored through the center. Draw your wire also through this, and then by turning the board, you can, in wrapping the wire around it, tighten that at your pleasure, and loosen it also, which should always be done in the fall, as the cold contracts the wire, and the strain would be too great. Now you can fasten the wire to the intermediate posts by small staples, which are manufactured for this purpose, and can be had in any hardware store. If your vineyard slopes to the south, and the rows run parallel with the hillside, fasten on the south side; if to the east, fasten to the east. Laths will, of course, do instead of wires, but the posts must then be set much closer; laths always need repairing; the wires are much more convenient to tie to, and in the end much cheaper. Many train to stakes. Where timber is plenty, stakes may be cheaper, yet it is much more labor to tie to them, and the vines are always in disorder, while they will cling to the wires with their tendrils, thus doing most of the tying themselves, and the bearing canes can be distributed much more evenly, producing more and better ripened fruit. I am satisfied that the additional cost of trellis will be more than paid by the larger and better crop the first bearing season. Fill all vacancies, if any occur, with extra strong vines in the fall.

CHAPTER XVIII.

TREATMENT OF THE VINE THE SECOND SUMMER.

We find the young vine at the commencement of the second summer pruned to three buds. From these we may expect two or three strong shoots to ripen into bearing canes for the next year. The first work will be to cultivate the whole ground. This can be done by a common turning plow, first throwing away a furrow at each side of the row, as in the first cultivation of corn, taking care not to go too deep, so as to injure the vine or its roots. Then hoe the space under and around the vines, either with the two-pronged German hoe, or the Hexamer hoe, stirring and inverting the soil to the depth of about 3 inches. Then take the plow again and throw the soil back to the vines, using care, however, not to cover them; stir the whole to a uniform depth, and leaving a shallow furrow in the middle. The ground should be dry enough to work well, and not clog; rather wait a few days than to stir the soil in wet weather. Of the three shoots which may grow, leave two to grow unchecked; the weakest is to be pinched as soon as about five or six leaves are developed, taking off the top of the young shoot with your thumb and finger. The other two, if Catawba or Delaware, you can let grow unchecked, but all the strong growing kinds, as Concord, Martha, Gœthe, etc., and all the *æstivalis* and *cordifolia* class, should also be pinched when the shoots have attained a length of 3 feet, or just above the second wire from above; this will force the laterals into a stronger growth, so that each will attain the size of a medium cane. On these we intend to have our fruit the coming season, as the shoots from buds on these laterals will produce more and finer fruit than those on the main canes, if left un-

checked; and they can also be kept under control much better. Figure 17 will show the result of training the second summer, with the method of bracing the trellis.

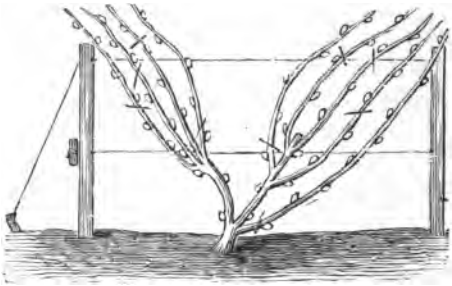


Fig. 17.—THE VINE AT THE END OF THE SECOND SEASON.

Figure 18 gives the vine, pruned and tied, at the end of the second season. Figure 19 represents the manner of training and tying the Catawba and Delaware, or other slow growing kinds.

The above method of training is a combination of the single-cane and fan-training system, which I tried first on the Concord from sheer necessity, when the results pleased me so much, that I have since adopted it with all

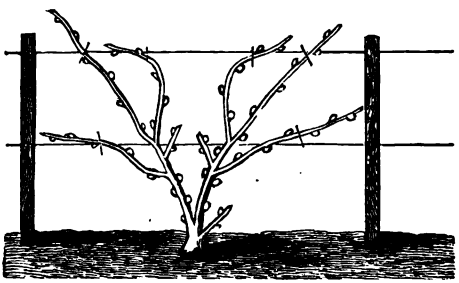


Fig. 18.—THE VINE PRUNED AND TIED.

the strong growing varieties. The circumstances which led me to the trial of this method, were as follows: In the summer of 1862, when my young Concord vines were

REESE LIBRARY UNIVERSITY OF CALIFORNIA

making their second season's growth, we had, in the beginning of June, the most destructive hailstorm I have ever seen here. The vines were not only stripped of all their leaves, but the young succulent shoots were also cut down to about 3 feet from the ground. The vines, being young and vigorous, pushed out strong laterals, each of them about the size of a fair, medium cane. In the fall, when I came to prune them, the main cane was not long enough, and I shortened in the laterals to from four to six buds each. On these I had as fine a crop of grapes as I ever saw, with large, well developed bunches and berries,

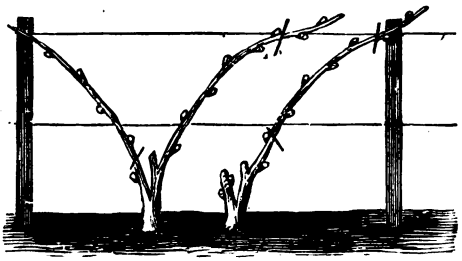


Fig. 19.—TRAINING SLOW GROWING VARIETIES.

and a great many of them, as each bud had produced its fruit-bearing shoot. Since that time I have followed this method altogether and have obtained the most satisfactory results.

The ground should be kept loose and mellow during the summer, cultivating as often as may become necessary during dry weather, and the vines are to be tied neatly to the trellis with bark or straw.

There are many other methods of training, as the old bow and stake training, so much in vogue formerly. But it crowds the whole mass of fruit and leaves so closely, that mildew and rot will follow as a natural consequence; it should have been given up long ago. But we have a class of grape growers who never learn or forget anything.

These will hardly prosper. The grape-grower, of all others, should be a close observer of nature, a thinking and reasoning being. He ought to experiment and try new methods all the time, and should he find a better, be willing to throw aside his old method, and adopt one more suited to the wants of his vines. Only in this manner can he expect to attain success.

There is also the arm system, of which we hear so much, and which certainly looks very pretty on paper. But paper is patient, and the advantages of the system cannot be denied, if every shoot and spur could be made to grow just as in drawings, with three fine bunches to each shoot. Upon applying it, however, we find that vines are stubborn, some shoots will outgrow others, and before we hardly know how, the whole beautiful system is out of order. It may do to follow with a few vines in gardens, or on arbors, but I do not think that it will ever be successfully adopted for vineyard culture, as it involves too much labor in tying, pruning, etc. I think the method already described will more fully meet the wants of the vine grower than any I have yet seen; it is so simple that an intelligent person can soon become familiar with it, and gives us new, healthy bearing-wood every season.

Pruning may be done in the fall, as soon as the leaves have dropped, and continued, on mild days, during the winter months.

CHAPTER XIX.

TREATMENT OF THE VINE THE THIRD SUMMER.

At the beginning of the third season we find our vine pruned to three spurs, of two buds each, and six short lateral arms of four to six buds each. These are tied firmly to the trellis, as shown in figure 18, for which purpose small twigs of the Golden Willow, of which every grape-grower should plant a supply, are the most convenient. In their absence, twigs of some of the wild willows, or good strong twine, may be substituted, though not near so convenient. The ground should be plowed and hoed as before, taking care, however, not to plow so deeply as to cut or tear the roots of the vines.

The vines being plowed and hoed, and, as we hope, pushing young shoots vigorously, we come to one of the most important and delicate operations to be performed on the vine, one of as great, or even greater, importance than pruning. This is summer-pruning, or pinching, *i. e.*, thumb and finger pruning. Fall pruning, or cutting back, is but the first step in the discipline to which the vine is to be subjected; summer pruning is the second; and one is useless and cannot be systematically followed without the other. Look at the vine well before you commence, and begin near the ground.

The time to commence is when the young shoots are 6 to 8 inches long, and as soon as you can see all the young bunches or buds, the embryo fruit. We commence on the lower spur, having two shoots; rubbing off, at the same time, all suckers or wild shoots that may have started from the crown of the vine below. From the two buds two shoots have started. One of them may serve as a bearing cane or reserve next summer, we, therefore, leave it unchecked for the present. The other,

which is intended for a spur again next fall, we pinch with thumb and finger, just beyond the last bunch or button, taking out the leader between the last bunch and the next leaf, as shown in figure 20, the cross line indicating where the leader is to be pinched. We now rub off all the shoots between the lower spur and the next lateral cane, should any appear, as they generally produce imperfect fruit and are quite too near the ground. Next take the spur on the cane, treating it precisely like the lower one, leaving the strongest shoot unchecked for a bearing cane next year, and pinching the other. Now go over all the shoots on the lateral canes, shortening each one to just above the last promising looking bunch. If a bud has started two, or even three shoots, rub off the weaker, leaving but one and the strongest, and if any bud has not started vigorously, rub it off altogether. Go over the other cane in the same manner, and if you think there are still too many bunches, take away the smallest. A vine in its third season, however strong it may be, should not be allowed to bear over 15 lbs. of grapes, and if allowed thirty to forty bunches it will have that quantity, provided it is not a variety which bears but small bunches. Now is the time to thin the fruit, before it has abstracted any strength from the vine. If any shoots are not sufficiently developed to show their condition, we pass them by, and go over the vine again after a few days.

Fig. 20.—PINCHING.

This early pinching of the young shoots has the tendency to throw all the vigor into the development of the young bunches and the leaves remaining on the shoot, which now develop with astonishing rapidity. It is a

gentle checking, and leading the sap into other channels, not the violent process which is often followed long after the bloom, when the shoots have so hardened that the knife must be used, and by which the plant is robbed of a large part of its leaves, to the injury of both fruit and vine. Let any one who wishes to satisfy himself, summer-prune a vine according to this method, and leave the next vine until after the bloom; he will soon be convinced which is best. Since I first practised this method, now about twenty years, it has added at least one-third to the quantity and quality of my crop, and it is now followed by most of the intelligent growers of my State. It also gives an early opportunity to destroy the small worms, a species of leaf-folder, which are very troublesome about this time, eating the young bunches and leaves, and which generally make their web among the tender leaves at the end of the shoot. The bearing shoots all being pinched back, we can leave the vines alone until after the bloom, only tying up the young canes from the spurs, should this become necessary. Do not tie them over and among the bearing canes, but lead them to the empty spaces in the middle, as our object must be to give the fruit all the air and light we can.

Fig. 21.—PINCHING THE LATERALS.

When they have bloomed, the laterals will have started from the axils of the leaves on the bearing shoots. Go over again, and pinch these back to one leaf, as shown in figure 21, the cross lines showing where the laterals are to be pinched. This will have the tendency to develop the remaining leaf very rapidly, enabling it to serve as a

conductor and elaborator of sap to the young bunch opposite, and shading that when it becomes fully developed. The canes from the spurs, which we left unchecked at first pinching, and which we design to bear fruit the next season, may now also be stopped or pinched when they are about 3 feet long, to start their laterals into stronger growth. Pinch off all the tendrils unless where they serve as supports to the young growth. This is a very busy time for the vine dresser, and upon his close attention and diligence now, depends, in a great measure, the value of his crop. A vast deal of labor can be saved by doing everything at its proper time.

This is about all that is necessary for this summer, except tying the young growth along the top wires, and an occasional tying of a fruit-bearing branch, if it should become too heavy. The majority of the branches will, however, be able to bear their fruit without tying, and the young growth which may yet be made from the laterals may be left unchecked, as it will serve to shade the fruit when ripening. This short and early pinching is also a partial preventive of mildew and rot, as it admits light and air to all parts of the vine. But I cannot caution too strongly against late cutting back, one of the first causes of disease, and ruinous to the vine, as the defoliation of the vine in August disturbs and violates all its functions, and enfeebles it.

The reader will perceive that fall pruning, or shortening-in the ripe wood of the vine, and summer-pruning, shortening-in and thinning the young growth, have one and the same object in view, namely, to keep the vine within proper bounds, and to concentrate all its energies for a two-fold object, the production and ripening of the most perfect fruit, and the production of strong and healthy wood for next season's crop. Both operations are only different parts of the same system, of which summer-pruning is the preparatory, and fall-pruning the finishing part.

If we think that a vine sets more fruit than it is able to bear and ripen perfectly, we have it in our power to thin it, by taking away all imperfect bunches and feeble shoots. We should allow no more canes to grow for next season's bearing than we need, if we allow three canes to grow where only two are needed, we waste the energies of the vine, which should all be concentrated upon ripening its fruit in the most perfect manner, and producing enough wood for next season's bearing, and of the best and most vigorous kind, but no more. If we prune the vine too long, we overtax its energies, making it bear more fruit than it can well mature, and the result will be poor, badly-ripened fruit, and imperfect wood. If we prune the vine too short, we will have a rank, excessive growth of wood and leaves, and encourage rot and mildew. Only practice and experience will teach the true medium, and the observing and thinking vine-dresser will soon learn where the true medium is, better than he can be taught by volumes of advice. Different varieties will, of course, require different treatment, and it would be folly to prune them all alike. A compact, slow grower, like the Delaware, will require different treatment from a rank grower like Concord, and much shorter pruning. The Delaware and Catawba fruit well upon single canes, while the Concord, Martha, and others, fruit better on spurs upon laterals, while most of the *æstivalis* and *cordifolia* classes, especially the Norton's, Cynthiana, and Taylor, will fruit better if pruned to spurs of two or three buds, on the old arms, than on young canes. With these latter, the old arms should, therefore, be retained as long as they are sound and vigorous, pruning all the healthy, good sized shoots to two or three buds; always, however, growing a young cane to fall back upon, should the old one become diseased. It is because so few of our common laborers will take the pains to study the habits and nature of their vines, and

do a little thinking for themselves, that we find among them but very few good vine dressers.

It is hardly necessary to state that the ground should be kept mellow and clean through the summer, and especially during the ripening of the fruit, but never touch it in wet weather.

At the end of this season, we find our vines, if Concords or similar varieties, with the old fruit-bearing canes, and a spur on each side, from each of which we have a cane, as the smaller one was stopped, like all other fruit-bearing branches, and which we now prune to a spur of two buds. The other, the young cane, which was stopped at about 3 feet, on which the laterals were left to grow unchecked, we prune as last season, each lateral being cut back to four to six buds, and the old canes which had borne fruit, are cut away altogether. With Norton's, Cynthiana, Taylor, etc., the old arms are left, and the well developed shoots are cut back to two buds each, as before mentioned, while the small, weak ones are cut away altogether. This leaves us with an arm on each side, to be tied the next spring, as shown in figure 18, and ends our operations for the season. Of the gathering of the fruit, as well for market as for wine, I shall speak in another place.

CHAPTER XX.

TREATMENT OF THE VINE THE FOURTH SUMMER.

We now consider the vine as established, able to bear a full crop. The operations to be performed are precisely the same as in its third year, only modifying the pruning, fruiting, etc., according to the strength of the vine, pruning shorter if the vine shows a decrease in vigor, longer, if it grows too rank.

Should the vines show a decrease in vigor, so as to indicate the need of stimulants, they may be manured with ashes, bone dust, compost, or still better, with surface soil from the woods or prairies. This will serve to replenish the soil which may have been washed off, and is much more beneficial than stable manure. When the latter is employed, a small trench may be dug in the middle of the row just above the vine, the manure laid in, and covered with soil. But an abundance of fresh soil, drawn around the vine, is the best of all manures.

Should your vineyard have vacancies, they had best be filled with layers from neighboring vines, made as follows: Dig a trench from the vine from which the layer is to be made, to the empty place, about 8 or 10 inches deep; bend into this trench one of the canes of the vine which has been left to grow unchecked for the purpose, and pruned to the proper length. Let the end of this layer-cane come out at the surface, where the new vine is wanted, and fill up the trench with well pulverized earth. It will take root at every joint, and grow rapidly, but as it draws a great deal of nourishment from the parent vine, that must be pruned much shorter. When the layer is well established, it is cut from the parent vine, either the second or third season. Such layers will fill up much better than if the vacancies are supplied by planting young vines, as the latter do not grow very vigorously, if set among the others, after the second season.

Pruning is best done in fall, but can be done any time during mild weather in winter, and here even as late as the middle of March. Fall pruning will prevent flow of sap, and the cuttings, if to be used for future plantations, or sold, are also better if made in the fall, and buried in the ground over winter, with their upper ends downwards. All the sound, well-ripened wood of last season's growth may be made into cuttings, and if they can be sold, will largely add to the product of the vineyard.

CHAPTER XXI.

TRAINING THE VINE ON ARBORS AND WALLS.

This has a different purpose from culture in vineyards, and, therefore, the vines require different treatment. Vineyard culture has for its object the most perfect fruit, and bringing the vine, with all its parts, within easy reach of the cultivator. Arbor culture has for its object the covering of a large space with foliage, for ornament and shade; fruit being but a secondary consideration, though a large quantity of fruit of fair quality can also be produced, if the vines are judiciously treated.

The first aim should be to grow very strong plants, so as to cover a large space. Prepare the border by digging a trench 2 feet deep and 4 feet wide, and fill with rich soil, rotten leaves, bones, ashes, etc. Set your plants in this, in the manner already shown in vineyard planting. Leave but one shoot to grow on them during the first summer, which ought to become very strong. Cut this cane back to three buds the next fall. Each of these buds will produce a strong shoot the next spring, which should be tied to the arbor and allowed to grow unchecked. In the following fall, cut each of these three canes back to three buds, as our first aim must be to get a good basis for our vines. These will give nine canes the next summer, and as the vine is now strong enough, we can begin to demand a crop from it. We have now three different sections or branches to the vine, each one of which bears three canes. Cut one of these three canes back to two eyes, and prune the other two canes to from six to ten buds each, according to the strength of the vine. Treat each of the three sections in the same manner. Next spring tie these neatly to the trellis, divid-

ing them equally, and when the young shoots appear, thin out the weakest, leaving the others to grow unchecked. Next fall cut back the weakest of the canes to two buds each, the stronger ones to three or four buds, the spurs at bottom to come in as a reserve, should any of the main arms become diseased.

Others prefer the Thomery or horizontal arm training, but I think it much more complicated and difficult. Those who wish to inform themselves about it, I refer to the books of Fuller and Mead, which are very explicit on the subject.

CHAPTER XXII.

OTHER METHODS OF TRAINING.

These are almost without number; one of the most common is to place three stakes around the vine, about a foot from it, and to wind the canes or arms around them spirally, until they reach the top. They are then "spurred in" every season, and no young canes grown, except to replace a decaying arm. This mode is much more inconvenient than a trellis, and it crowds fruit and foliage too much, inducing mildew. Another, much in vogue in Europe, and also in California, is the so-called bush or stool method of training. The vine is made to form its crown, *i. e.*, the part from which the branches start, from 12 to 18 inches above the ground and all the young shoots are allowed to grow, but summer pruned or checked above the last bunch of grapes. The next spring or fall all of the young shoots are "spurred-in" to two buds; this system of spurring-in is kept up, and the vine will at last present the appearance of a bush or miniature tree, producing all its fruit within

a foot from the crown, and without further support than its own stem. Very old vines, sometimes, have from a dozen to twenty spurs, and present, with their fruit hanging all around their trunks, a pleasing, but odd aspect. This method could not be applied here with any chance of success to any other than very slow and stocky growers. The Delaware, the Alvey, and also the Eumelan, would be the most suitable, as they are very close-jointed, stocky, and hardy. It would be useless to try it with strong growers.

Another method of dwarfing the vine is practised to form a pretty border along walks in gardens or along terraces, and is as follows: Plant the vines about 8 feet apart, treat them the first season as in common vineyard culture, but cut back to two buds. Provide posts 3 to 3½ feet long, and pointed at one end; drive these into the ground for 18 inches, and nail a lath on the top. This is the trellis, and should be about 18 inches above the ground, or 2 feet, if you prefer. Allow both of the shoots from the vine to grow unchecked, and when they have reached the trellis, tie one to the right, the other to the left, allowing them to grow at will along the lath. The next fall, cut back to the proper length to meet the other vine, and in spring, tie firmly to the lath. When the young shoots appear, all are rubbed off below the trellis, but all those above the trellis are pinched, as in vineyard culture, beyond the last bunch of grapes. The trellis, with its garland of fruit, will look very pretty. In the fall, all the shoots are "spurred-in" to one or two buds, one being allowed to grow from each spur, to produce fruit the next summer; the same treatment is repeated every year.

During a trip among the vineyards of Western New York, on the shores of Lake Erie and Keuka, or Crooked Lake, I observed a method of training which seems to produce good results there, but which I think would not

prove successful here, as our hot sun would scald the leaves, and the grapes being so near the ground would be more liable to rot. I can but think that even in these localities the method described by me, would be better, and save a good deal of labor.

Their method is as follows: They grow two canes on each vine, which are tied horizontally to the lower wire, one to the left, the other to the right, and also a spur on each arm to produce a new cane for next year. The shoots, which grow from the eyes on the two horizontal canes, are left to grow unchecked, and when they have become long enough to reach the second wire, are tied to it, and from there to the upper wire, thus bearing the fruit all between the lower and second wires. The next fall the cane, which has borne the fruit the last summer, is cut off close to the spur, and the new cane grown from it takes the place of it the next summer. It is a very simple way of renewal training, but were we to do it here, the leaves which are on the main shoots would drop off, leaving the fruit exposed; while with the system of summer-pruning I follow, the young and vigorous leaves on the pinched laterals shade the fruit perfectly, and remain fresh and green. Besides, it takes an immense amount of tying and tying material, and we can pinch four shoots in a shorter time than we can tie one. As our pinched shoots become very stocky, they will bear the weight of all the fruit without tying, and the slanting direction in which we tie will distribute the fruit more evenly. I believe, therefore, that our New York growers would do well to give this method a trial, and compare results.

I also saw the horizontal arm training in great perfection at Mr. H. E. Hooker's, at Rochester, and confess that his arms of the Brighton, with their handsome clusters, looked very handsome. He thinks he could carry an arm to the distance of 50 feet in the same way. His treatment consists simply in "spurring-in" the young

shoots on his canes along the first wire to one to two eyes, growing his fruit on these, and leaving the old arm, pruning back the young shoots to spurs every year, leaving the bearing shoots unchecked, and tying them to the wires above. While it succeeds there, I have my doubts as to its applicability with us, for the reasons already given, nor do I believe that he can grow any better fruit even there, than could be obtained by our simpler method.

CHAPTER XXIII.

DISEASES OF THE VINE.

I cannot agree with those writers who assert that the diseases of the vine are not threatening in this country. They are so formidable that whole districts where grape growing was formerly followed, have given up the culture of the vine almost entirely, and it seems as if all varieties of the *Labrusca* become, more or less, a prey to them. This may, to a certain extent, be attributed to the Phylloxera, or Root Louse, which so enfeebles the plant, that it can not withstand the changes of our variable climate. But even the Concord, which is almost Phylloxera proof, has rotted worse than any other during the last few years, although formerly considered one of the most reliable. I think one of the reasons why the *Labrusca* class is so subject to disease, is the tendency of the vines to root near the surface, as they are thus more liable to be affected by excessive wet, or the reverse extreme, drouth. It is, therefore, fortunate indeed, that we have some varieties which do not rot, at least to such an extent as to affect their crop. Almost all of the older

varieties of these belong to the *æstivalis* class, and among them, the Norton's Virginia and Cynthiana stand pre-eminent. During the forty years that the Norton's has been known, the rot has never materially affected the crop, and the Cynthiana rivals it in that respect, being equally healthy, while its wine, in quality, excels that of the Norton. The *cordifolia* class also bids fair to furnish us varieties of the "iron clad" type, in the Elvira, Transparent, Pearl, Uhland, etc. Both of these classes root deeply, and in this, I believe, is to be found the reason for their greater health. Both are true wine grapes, with no toughness of pulp, the Norton's and Cynthiana furnishing us the types for red wine, the others, the delicate and smooth white wines. On these I make bold to say, the future of our country as a "Wineland" depends; not on the windy appliances of sulphur, and other remedies against rot and mildew, and my advice to the beginner is: do not plant largely of any variety subject to disease, but plant those which will not need these remedies. I have no doubt that there are varieties adapted to every section of the country which are free from disease, and it will certainly pay the planter to seek them out.

Mildew is our most formidable disease, and very often sweeps away two-thirds of a crop of Catawbas in a few days. It does not seem to affect the Concord and Martha. Generally mildew appears here from June 1st to June 15th, after abundant rains, and damp weather. It is a parasitic fungus, and sulphur applied by means of a bellows, or dusted over the fruit and vine, is a partial remedy. Close and early summer-pruning will do much to prevent it, throwing, as it does, all the strength of the vine into the young fruit, developing it rapidly, and also giving free access of air. In some varieties, Delaware for instance, it will only affect the leaves, causing them to drop off, after which the fruit, though it may attain full size, will not ripen or become sweet, but shrinks and

drops. In seasons when the weather is dry, and the air pure, mildew will not appear. It is most prevalent in locations with a tenacious subsoil and where malaria abounds, being less frequent in soils with good drainage and in high, exposed situations. Under-draining is also a partial preventive, as excess of moisture about the roots and in the air is, no doubt, its principal cause.

The Gray Rot, or "Grape Cholera" (so-called), generally follows the mildew, and I think the latter its principal cause, as it is generally found on berries of which the stems have already been affected by mildew. The berry first shows gray streaks and marblings; in a few days it turns to a grayish-blue color, withers, and drops from the bunch. It will continue to affect berries until they begin to ripen and color, but is confined to a few varieties only, the Catawba, Diana, and a few others.

The Spotted, or Brown Rot, has been most destructive of late among the Concord, Martha, Rogers' Hybrids; in short, nearly all of the *Labruscas*, with the exception of the Ives, Perkins, and a few others, too poor in quality to be very desirable. It appears like a small puncture on the berry, which will take on a liver-colored hue and spread very rapidly. In 1878 it destroyed almost the whole Concord crop along the lower Missouri and Mississippi. Longer fall pruning and heavier bearing of the vine will prevent it to some extent, also close and early summer-pruning, as it is worse on vines with a rank growth, and on poorly drained soil. Training on the trellis higher than is generally followed (which is a natural consequence of longer pruning), will also be found a partial preventive, in short, anything which will give a freer circulation of air and more exposure to the light will be of aid.

There is another form of rot, appearing mostly on the Herbemont, Lenoir, Hermann, and sometimes on the Taylor, which generally comes after frequent showers,

close, sultry air, and hot glimpses of sunshine between showers. It at first appears as a grayish spot on the foliage, which shrivels as if burnt, and the berries dry up as if scalded by hot water. It comes in spots; sometimes all the fruit on one arm will be destroyed, while that on the other arm on the same vine is healthy, and all of it will ripen.

The best method of avoiding all these diseases is to plant varieties not subject to them, and with the manifold kinds we now have, some can surely be found that will remain healthy in every locality at all adapted to grape growing. That we have varieties exempt from disease, the experience with the Norton's Virginia, wherever cultivated, has fully demonstrated. No sensible man, however, will suppose that one variety should be suited to all locations over this wide country. It behooves us then, each to experiment, and ascertain which are suited to his particular locality, and for these experiments to choose such as are considered most healthy elsewhere, and especially in locations similar to his, in climate and soil.

CHAPTER XXIV.

INSECTS INJURIOUS TO THE GRAPE.

As the most destructive of all, because it works chiefly under ground, and the mischief it does will only be perceived in its effects, I may consider the *Phylloxera vastatrix*, or Grape-vine Root-louse. Concerning the existence of this pest, we have for a long time been ignorant, until the efforts of our State Entomologist, Prof. C. V. Riley, and of other Entomologists, especially Prof. Planchon, of France, have enlightened us upon the subject, and made us aware of the danger threatening

our vineyards, but especially those of Europe and California, where the *vinifera* class had so far been cultivated almost exclusively. It threatens now to sweep out of existence that whole class, and it is a very noteworthy fact, that from this country from which the fell destroyer was imported into Europe, should also come the only effective remedy so far found, namely, the introduction of Phylloxera proof varieties of vines, which are found chiefly in the *æstivalis* and *cordifolia* (or *riparia*) classes. All other remedies, except inundation, seem to have failed, and Prof. Planchon, in a letter to me, expresses his firm belief, that the only hope of saving that great source of wealth to the French nation, their vineyards, is in the introduction and general cultivation of our Phylloxera proof varieties of the grape, first as a stock to graft the *vinifera* upon, and secondly to cultivate our grapes for their fruit, if they can find varieties which will make such wines as the popular taste there demands. With this object in view millions upon millions of American cuttings and plants have already been imported into France, and the demand is still as active as ever. But the Clinton and Concord, which were first imported for that purpose, have not proved satisfactory. The first succeeds well enough, but is too rambling a grower, and not even a good stock, on account of its tendency to sucker, and the quality of its wine is not good enough to suit the palate of the French connoisseurs. The Concord seems to fail even as a stock, as its roots are too near the surface, and it ripens its fruit and wood too early. The hot summers there appear to affect it, and it turns yellow prematurely. The Lenoir, or Jacques as they call it there, for a time promised to be all they wanted, as it was vigorous and made an exquisite red wine. But last summer the dry-rot appeared upon it also, the Cunningham and Herbemont have been imported largely, but they fear that they will not be quite hardy enough for

Northern France. The Norton's, Cynthiana, and Hermann seem not to be quite satisfactory in their growth, though their wines are all they desire. However, if they have been mostly grafted upon *vinifera* stocks, this is not surprising, for when the root is destroyed or weakened, the graft can not flourish, and it is rather difficult to establish a vineyard of them even here; but when once established, it will last. Their attention is now drawn towards the Taylor, as a very easy vine to propagate, and an excellent stock to graft upon, and if we once have varieties which have the Phylloxera proof roots of the Taylor, and which besides are abundant bearers, as we now seem to have in the Elvira and her sisters, we have found what is desired, and the supposition is but natural that they will become in time the wine grapes of the whole civilized world. It is indeed wonderful that, when this insect threatens to destroy the grape vines of the Old World, its remedy should be found here in our Missouri vineyards, and it may truly be called providential. It would require too much space to give the full natural history of the insect, and I refer those who wish to study it to the valuable Report* of Prof. Riley, of which I copy the most important part:

How the Phylloxera Affects the Vine.—Prof. Riley says: "The result which follows the puncture of the Root-Louse is an abnormal swelling, differing in form according to the particular part and texture of the root. These swellings, which are generally commenced at the tips of the rootlets, eventually rot, and the lice forsake them and betake themselves to fresh ones. The decay affects the parts adjacent to the swellings, and on the more fibrous roots cuts off the supply of sap to all parts beyond. As these last decompose, the lice congregate

* Sixth Annual Report on the Noxious, Beneficial, and other Insects of the State of Missouri, by C. V. Riley, State Entomologist. St. Louis, Mo., 1874.

on the larger ones, until at last the root system literally wastes away.

"During the first year of attack, there are scarcely any outward manifestations of disease, though the fibrous roots, if examined, will be found covered with nodosities, particularly in the latter part of the growing season. The disease is then in its incipient stage. The second year all these fibrous roots vanish, and the lice not only prevent the formation of new ones, but, as just stated, settle on the larger roots, which they injure by causing hypertrophy of the parts punctured, which also eventually become disorganized and rot. At this stage the outward symptoms of the disease first become manifest, in a sickly, yellowish appearance of the leaf and a reduced growth of cane. As the roots continue to decay, these symptoms become more acute, until by about the third year the vine dies. When the vine is about dying it is generally impossible to discover the cause of the death, the lice, which had been so numerous the first and second years of invasion, having left for fresh pasturage."

"The life-history of the Grape Phylloxera may be thus epitomized: It hibernates mostly as a young larva, torpidly attached to the roots of the vine, and so deepened in color as generally to be of a dull brassy-brown, and, therefore, with difficulty perceived, as the roots are often of the same color. With the renewal of vine growth in the spring, this larva moults, rapidly increases in size, and soon commences laying eggs. These eggs, in due time, give birth to young, which soon become virginal, egg-laying mothers, like the first; and, like them, always remain wingless. Five or six generations of these parthenogenetic, egg-bearing, apterous mothers follow each other; when—about the middle of July, in this latitude—some of the individuals begin to acquire wings. These are all females, and like the wingless mothers, they are parthenogenetic. Having issued from the ground, while in the

pupa state, they rise in the air and spread to new vineyards, where they deliver themselves of their issue in the form of eggs or egg-like bodies—usually two or three in number, and not exceeding eight—and then perish. These eggs are of two sizes, the larger about 0.02 inch long, and the smaller about three-fifths of that length. In the course of a fortnight they produce the sexual individual, the larger ones giving birth to females, the smaller to males. These sexual individuals are born for no other purpose than the reproduction of their kind, and are without means of flight, or of taking food, or excreting. They are quite active and couple readily; one male being capable, no doubt, of serving several females, as Balbiani found to be the case with the European *quercus*. The abdomen of the female, after impregnation, enlarges somewhat, and she is soon delivered of a solitary egg, which differs from the ordinary eggs of the parthenogenetic mother only in becoming somewhat darker. This impregnated egg gives birth to a young louse, which becomes a virginal, egg-bearing, wingless mother, and thus recommences the cycle of the species' evolution. But one of the most important discoveries of Balbiani is that, during the latter part of the season, many of the wingless, hypogean mothers perform the very same function as the winged one; *i. e.*, they lay a few eggs which are of two sizes, and which produce males and females, organized and constructed precisely as those born of the winged females, and, like them, producing the solitary impregnated egg. Thus, the interesting fact is established that even the winged form, is by no means essential to the perpetuation of the species; but that, if all such winged individuals were destroyed as fast as they issue from the ground, the species could still go on multiplying in a vineyard from year to year. We have, therefore, the spectacle of an underground insect possessing the power of continued existence, even when confined

to its subterranean retreats. It spreads in the wingless state from vine to vine, and from vineyard to vineyard, when these are adjacent, either through passages in the ground itself, or over the surface. At the same time it is able, in the winged condition, to migrate to much more distant points. The winged females, as before stated, begin to appear in July, and continue to issue from the ground until vine growth ceases in the fall. Yet they are much more abundant in August than during any other month, and on certain days may be said to literally swarm. Every piece of root a few inches long, and having rootlets, taken from an infested vine at this season, will present a goodly proportion of pupæ; and an ordinary quart preserve jar, filled with such roots and tightly closed, will furnish daily, for two or three weeks, a dozen or more of the winged females, which gather on the sides of the jar toward the light. We may get some idea, from this fact, of the immense numbers that disperse through the air to new fields, from a single acre of infected vines, in the course of the late summer and fall months.

"If to the above account we add that occasionally individuals abandon their normal underground habit, and form galls upon the leaves of certain varieties of grape-vine, we have, in a general way, the whole natural history of the species."

He takes the ground that it is the cause of most of the diseases in the *Labrusca* class, and especially in the Catawba, as a vine with a diseased root can not produce healthy fruit, and these conclusions are certainly logical. He advises grafting on Phylloxera proof roots as a remedy, and to those wishing to save such varieties as the Catawba and Delaware, this is certainly the best course. But I think that they are already superseded by grapes of better quality, and my advice is to plant none but Phylloxera proof varieties. So far as I know, the follow-

REESE LIBRARY OF THE UNIVERSITY OF CALIFORNIA

ing varieties are especially subject to its ravages: Catawba, Delaware, Hartford, most of Rogers' Hybrids, Iona, Isabella, Creveling, Diana, Maxatawney, Cassady, Rebecca, Croton. The following are not quite exempt, but are so vigorous that they seem but little injured: Concord, Martha, Gœthe, Wilder, Ives, Perkins, Telegraph, Mary Ann. The whole *æstivalis* and *cordifolia* group appear to be free from its ravages. It is strange, however, that the gall-producing type of the insect will prefer the leaves of the Taylor and Clinton, while the type which works at the root does not affect them.

The other insect enemies, although very numerous, are not so devastating as the Phylloxera.

The common Gray Cut-worm will often eat the tender shoots of the young plantations, and draw them into the ground below. It can be readily detected, so soon as its ravages are seen, by stirring the ground about the vine, when it will be found under some of the loose clods, and easily killed.

The small worms, belonging to the leaf-folding class, some of them white, some bluish-green, have already been mentioned under "Summer-pruning." They should be destroyed at that time; closely watch them when they make their webs among the young shoots, as they will become very destructive if not checked in time.

Another leaf-folder comes about mid-summer, making its web on the leaf, drawing it together, and then devouring its own house. It is a small, whitish-gray, active worm, which will drop to the ground as soon as disturbed. I know of no other way but to catch and destroy it.

Several beetles will feed on the young buds before they expand, one about the size and color of a hemp seed; another is of a steel-blue color; both are very active. They can be caught in early morning, when they are yet torpid, by spreading a newspaper under the vine and shaking it, when they will drop upon the paper.

The Grape-vine Fidia, a small beetle, ashy-gray, sometimes comes in swarms, preying on the foliage, riddling it completely, and even attacking the young fruit. Hand-shaking, as above, in the morning, is also the best treatment for these, as well as for the Grape Curculio.

The Thrip, a small, three-cornered, whitish insect, has sometimes become very troublesome, as they eat the under side of the leaves of some varieties, especially of the *æstivalis* class, when the leaf will show rusty specks on the surface, and eventually drop. Carrying lighted torches through the vineyard at night, and beating the vines to disturb them, is one of the best remedies, as they will fly into the flames. They are a great annoyance and should be destroyed in time, before they get too numerous, as they will defoliate whole vineyards. It is strange that they have almost entirely disappeared in our Missouri vineyards, where they were so numerous formerly, and are now very annoying in the vineyards on Crooked Lake, New York, where I saw them in great abundance.

The Aphis, or Plant Louse, covers the young shoots of the vines occasionally, sucking their juice. The best remedy is taking off the shoot, and crushing them under foot.

The Grape-vine Sphinx is a large, green worm, with black dots. It is very voracious, but can easily be found and destroyed. The worms do a great deal of mischief, but fortunately are not very numerous. The best remedy against them, and all other caterpillars, is hand picking.

The Rocky Mountain Locust, or Grasshopper, as it is generally called, is one of the most destructive insects in those districts invaded by it, and ruined the crops of nearly two seasons in some sections in 1875. Fortunately its range is very limited, and it appears but rarely. But when once it gets into a vineyard, not a green leaf or shoot is left, and if this occurs as late as the first of

June, it stunts the vines for the next season. One of the best remedies is to dig a trench 2 to 3 feet wide, at the side of the vineyard, from whence they are expected, into which they will tumble, and they should then be crushed by dragging a log or roller along the ditch. If this is done repeatedly they may be kept out. It is a strange occurrence, however, that in the districts which they invaded in 1875, nearly all other injurious insects have since disappeared, and the crop of last season was exceptionally free from their ravages.

Wasps and Bees are sometimes very troublesome when the fruit ripens, wounding the berries and sucking the juice. A great many can be caught by hanging up bottles with a little molasses, into which they will readily crawl and seal their fate. But while there are many injurious insects, we may also count some of them among our best friends, which will greatly assist in destroying the others, and which we should hold in grateful remembrance. Among these is the little Lady Bug, the small red or yellow and black beetle, which is always on the look-out and very active in destroying the Aphis and White Thrip. These should be fostered, and not destroyed, as is done by many ignorant persons. The Mantis, the Rear Horse, or Devil's Horse, as it is often called, but the correct name of which is Camel Cricket, is the friend of the vine-grower. It destroys countless numbers of injurious insects, especially the native grasshoppers and katydids, which are so apt to cut off the bunches just before ripening. They and their eggs, which are often found on the vines glued together in a mass, like a rather square cocoon, should be carefully preserved, and even colonized. We place our common toad among our friends, as it is a great destroyer of noxious insects, and always on the hunt for bugs of all kinds. The toads and our common active little lizards, should be treated with kindness by us, not killed, as they are by many unthink-

ing people who have a mistaken idea that they are injurious and poisonous.

BIRDS.

Generally speaking birds are the friends of the vintner, and should be fostered, not repelled, but there are a few species which rarely visit the vineyard except to feast upon the grapes, and these should be destroyed. The Oriole is one of these, and the best plan to get the little rascal is to place a few dry bushes above the trellis, on which he will alight and can then be shot. Or these twigs may be smeared with bird lime, to which he will stick. The Red-bird, or Cardinal, the Thrush, and Catbird, are also very destructive, and it is still an open question with me whether to feed them with sweet grapes or to kill them and do without their sweet songs in the future. But our pretty little Quails, though they will occasionally pick berries when they hang within their reach, should certainly be fostered, not killed; for they devour a great quantity of insects during the whole year, and though passionately fond of sport myself, I can not find it in me to shoot them when they make their home about the vineyard. Ducks, chickens, and turkeys are also very beneficial, destroying a multitude of injurious insects, but they should be kept out while the fruit ripens.

CHAPTER XXV.

FROSTS—WINTER PROTECTION.

Our winters are rarely so severe as to injure or kill the hardiest varieties, such as Concord and Gœthe, although the winters of 1863, 1872, 1874, and 1878, may be cited as instances when even these and Norton's were injured. They often, however, harm the Herbemont, Cunningham, and Lenoir. These can be protected by bending the vines down in the fall, and covering them with earth thrown on with the plow. To prepare them for this, prune as soon as the wood is fully ripe, and after a rain, when the canes bend easily, go through, and while one man bends the canes down along the trellis, let the other throw a few spadefuls of earth upon them, to keep them down. Then follow with the plow, and they can be easily covered. But do not take them up in spring until danger of frost is over, for they will become more tender by being under ground all winter, and even a moderate frost will injure the buds. In taking up, run a fork under them and lift them out. They should not be covered too deep, a light protection is enough; but to merely bend them down without covering, as some advise, is worse than leaving them on the trellis, as they are more easily injured here, where we do not often have snow to cover them. All hardy varieties should be cut loose in fall, as when the wind can sway them about they are not so apt to be injured. One of the surest preventives of injury by frost is, however, to plant none but the hardiest varieties. None of the *cordifolia* class, as far as I know, have ever suffered, and here again the Elvira stands pre-eminent, as not a bud was hurt, even during the hard winters of 1872-'74 and, '78.

But while we have methods to protect even the most tender in winter, by a little extra labor, I know of no generally effective means of protection against early frosts in fall and late frosts in spring. We should, therefore, avoid all locations subject to these, which are generally those near small streams, creeks, and rivulets, while locations on the large rivers, and on the high table lands, are generally free from them, and have, in fact, a season of a month earlier in spring, and a month later in fall, free from frosts. This is certainly very important to the grape-grower, and he should look to it closely before choosing his location. It is sad and disheartening to see the fair promise of early spring browned, wilted, and blighted by a single night's frost. But if it does occur, as it sometimes will, even in the best locations, do not become altogether discouraged. Every bud on the vine is, in fact, a triple one. The main fruit bud in the center will generally start first, and if this is destroyed, the two secondary buds will often push, and although they will not produce so many or as large bunches, will often yield a pretty fair crop.

But the vines are threatened with the same danger in fall in these unfavorable locations ; to have one's grapes and the still growing canes withered by an early frost in fall, when just ripening, and fit for nothing but vinegar, is a sad disappointment. Therefore look well to this, and do not select an unfavorable location, when there is an abundance of the best to be had.

CHAPTER XXVI.

GIRDLING, THINNING, AND MISCELLANEOUS MATTERS.

The method of girdling appears to have been invented by Col. Buchatt, of Metz, in 1745. He claimed for it that it would also greatly improve the quality of the fruit, as well as hasten its maturity. It cannot be denied that it accomplishes the latter; it also seems to increase the size of the berries, but I hardly think the fruit compares in flavor with that ripened in a natural way. But it may be of practical benefit to those who wish to grow the fruit for early market, as it will enable them to supply their customers a week earlier, and also make the fruit look better. I will, therefore, describe it briefly. It can be done either on the wood of last year's growth, or upon the bearing shoot itself; but in any case only upon such as can be spared at next fall pruning. If you desire to affect the fruit of a whole cane, or arm, cut away a ring of bark by passing your knife all around it, and make another circle about half an inch above the first, taking out the ring of bark between them. It should be done immediately after the fruit is set. The bunches of fruit above the incision will become larger, and the fruit ripen and color finely about a week before the fruit on the other canes. If a single shoot only is to be affected, make the ring just above its base. Of course, neither cane nor shoot, thus girdled, can be used for bearing next season, and must be cut away. About the same result is obtained by twisting a wire tightly around the vine and thus arresting the flow of sap downwards, which then develops the fruit much faster.

Ripening can also be hastened by planting against the south side of a wall or board fence, where the reflection of the rays of the sun will create a greater degree of warmth.

But nothing is more absurd than the practice of some, who will take away the leaves from the fruit, to hasten maturity. The leaves are the lungs of the plant, the conductors and elaborators of sap, and nothing can be more injurious than to take them away at the very time when most needed. The natural consequence is the withering and wilting of the bunches, and should they ripen at all, they will be flat and deficient in sugar and flavor. The injurious "cutting in" of the young growth late in August, already referred to, is about of a piece with this folly, and will not only be detrimental to the fruit, but also to the ripening of the wood for next year. While all crowding of the young growth with the bearing canes should be avoided, to give free circulation of air, yet the leafy canopy of the young canes over the top of the trellis, will be in the highest degree beneficial to the ripening of the fruit. There is nothing more pleasing to the eye than a vineyard in September, with its wealth of dark-green foliage, and the rich clusters of the fruit beneath, coyly peeping from under their leafy covering. Good fruit will only ripen in partial shade, and such grapes will have a rich bloom and color, as well as a thin skin and a rich flavor, which those hanging in the scorching rays of the sun can never attain.

THINNING THE FRUIT.

It will sometimes be necessary to thin the fruit, in order to more thoroughly develop the remaining bunches. The best thinning is the reduction of bunches and bearing shoots, at the first summer-pruning, and which has already been mentioned. Let the vine dresser always remember that one fine bunch is worth more than two or three small, badly grown ones and, therefore, take away all the small, imperfect bunches and weak shoots. If the number of bunches on each fruit-bearing branch is reduced to two, it will do no injury, but make them so

much more heavy and perfect. Thinning of the berries with a small pair of scissors, often resorted to with grapes grown under glass, is a very laborious process to follow in vineyard culture; though it will certainly make the remaining berries more perfect, it will hardly be generally adopted.

RENEWING OLD VINES.

Should a vineyard become old and feeble, it can be renewed by layering. To prepare for this, prune all the old wood from the vines, leaving but the thriftiest young cane, then dig a trench from the vine along the trellis, say 3 feet long and 10 inches deep, cut off the surface roots of the vine and bend it down into the trench, fastening with a hook, and let about three buds of the young cane come out above the ground, at the end of the trench. Then fill up with well pulverized soil. The vine will make roots at every joint, become vigorous and young again. Of course a season's crop will be lost, but the vine will amply repay for it the season following.

A FEW NECESSARY IMPLEMENTS.

PRUNING SHEARS.—These are very handy, as with them the work can be done quicker and easier than with

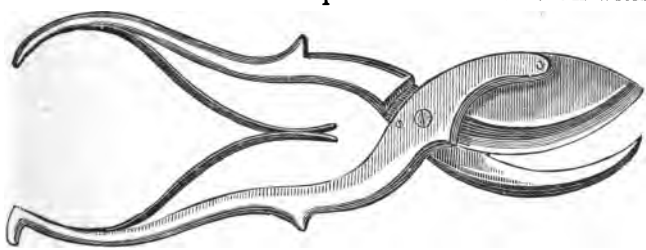


Fig. 22.—PRUNING SHEARS.

a knife, and but a slight pressure of the hand will cut a strong vine. Figure 22 gives the shape of one for heavy pruning. They are now made by several establish-

ments, and can be had at nearly all good hardware stores. The springs should be of brass, as steel springs are apt to break. A much lighter and smaller kind, with but one spring, is very convenient for gathering grapes, clipping out unripe or imperfect berries, and also in making cuttings. Shears will cut the stem easily and smoothly, without jarring the vine, and are much superior to a knife. No one who has tried them will want to use a knife again.

PRUNING SAWS.—These are sometimes necessary to cut out old, diseased stumps, although if a vine is well managed this will seldom be necessary. Figure 23 shows

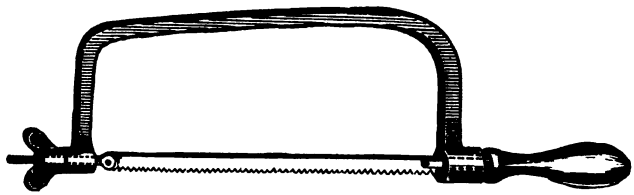


Fig. 23.—PRUNING SAW.

a kind very convenient for the purpose, as also for orchard pruning. The bow is of steel, the blade narrow, and so connected with the wooden handle, that it can be turned in any direction, and can be tightened by a screw and nut above.

CHAPTER XXVII.

GATHERING AND MARKETING THE FRUIT.

Here, of course, the vineyardist aims mainly at profit, and is often induced to cut the fruit when hardly colored, that he may realize a higher price by being early in the market. But if he values his reputation and wishes to create a lasting demand for his fruit, he should not market it before it is, at least, fully colored and eatable. The first Hartfords (a very poor grape even when fully ripe), which are brought into market but half-colored, sour and unripe, generally spoil the demand for grapes for weeks thereafter. People buy them, try them, and pronounce them, as they really are, unfit to eat, and will not touch them again for some time. Wait, therefore, until your fruit is fully colored and fit to eat; whoever buys of you then will buy again, and his stomach will not be soured and poisoned by unripe fruit. Again, what you may lose in price, you will gain in steady demand and higher figures all through the season, besides gaining in weight, for the riper the grapes (at least, until they are over-ripe and shrivel), the heavier they will weigh. Moreover, if grapes are not ripe when cut, they will shrivel and wilt (as they will not ripen after gathering), and thus will look indifferently if cut but a day or two.

To ship them any considerable distance to market, they should be packed in shallow boxes, not more than two layers above each other. Paper boxes, holding about 3 to 5 lbs. each, are now much used for the purpose, and fitted into crates so as to ship securely. They are more convenient for the trade than the crates formerly used, with three drawers, and which are, therefore, nearly abandoned.

Gather only in dry weather, cut the bunches carefully, with as long a stem as possible for convenient handling, and clip out carefully all unripe, shrivelled, or decayed berries, taking care not to rub off their bloom. Then lay them evenly, with stems downwards, fill the boxes well to prevent shaking, filling all interstices with small bunches. It is better to press down slightly and evenly with the cover, than to pack too loose, as they at any rate shake down in carriage. The riper they are the safer they will carry. I have always obtained a higher price by waiting until the rush was over, and then selling when they became scarce. The Concord, Martha, Wilder, Gœthe, and Elvira, have a very thin skin, and can not, therefore, be kept much after the first of October, but Lindley, Ives, Catawba, and especially North Carolina and Rogers' No. 2, can be kept for months, having a tough skin. Indeed, Rogers' No. 2 would keep until March if stored away, packed in small boxes, in an even, cool temperature. Norton's Virginia and Cynthiana can easily be kept all winter, and are very spicy and good, though they will shrivel somewhat. But, as mentioned before, any variety must be fully ripe to keep well. I think too little attention has been paid to the keeping of grapes until the holidays, at least, when high prices could be realized for them; that this can be done has been proved beyond a doubt. But for long keeping choose only the varieties with rather tough skins, and keep them in an even temperature of about 40°. They will keep better if fine paper is put between the layers, and the room should have the necessary ventilation. Examine from time to time, and remove all defective berries.

The best package for carrying grapes to market, and which is now used almost entirely, is a cheap basket made of splints. These are made to hold 8, 12, and 18 lbs., with a cover fastened by clasps or wire. They can be had at the factory at 50c., 60c., and 70c. per dozen; they

have a bow handle in the middle, which serves as a protection against tumbling about, and is also convenient in carrying. The basket is weighed with the fruit and sold at the same price per pound, and it is well worth this price to the purchaser for home use. This basket seems to be the perfection of a fruit package, and I think will come into general use for peaches, pears, plums, etc., being light, cheap, durable, handy, and effectually protecting the fruit.

It was a pleasing sight, indeed, to see the stacks of these baskets at every vineyard and wharf on Crooked Lake, waiting for the little steamers which cross and re-cross the Lake to take them to Penn Yan, from whence they are shipped to all the principal city markets; finding their way to New York, Boston, Baltimore, Philadelphia, etc., to be sold there at a price which enables even the poorest family to feast occasionally on their luscious contents. There is a vast trade established in them already, which is steadily increasing. We can readily imagine that these shores will soon become one of the greatest of summer resorts, and that thousands upon thousands will leave the crowded cities, for a few weeks at least, to take a "grape cure," as is now a common practice in Europe, to return to their duties in active life strengthened and invigorated by the pure air and health-giving diet. Truly this country is a wonderful one, rich in all of God's blessings. That the American citizen, constantly in the rush and whirl of business, needs, above any and all others, such recreation as a visit like this would afford, none will deny. Let me hope that it will soon become fashionable (and it need but become so to be adopted by all who can afford it), to devote a few weeks annually to living a life of innocent recreation among the vineyards, and come back better, healthier, and stronger men and women. To accomplish this will be one of the successes of grape culture, and not the least.

GATHERING THE FRUIT FOR WINE.

All varieties where it is desirable to develop the fullest aroma, should be allowed to hang as long as it is safe to leave them, as the longer they hang on the vines, the more will their peculiar aroma be developed, and also the greater the amount of sugar. It will make a very material difference in the quality of such wines, if allowed to hang even a week later. But those varieties of which the peculiar aroma is not desirable, and which must at any rate be improved by adding sugar, had better be taken when barely ripe. Why I make this difference will be more fully explained in "Wine Making."

In gathering for wine use clean tin or wooden pails, cut the stems as short as possible, and clip or pick out all unripe, dry, or rotten berries, leaving none but perfectly sound berries on the bunch. The further process will be described in Part III.

PART II.

EXPERIENCE OF OTHER GRAPE GROWERS, WITH ITEMS OF GENERAL INTEREST.

CHAPTER XXVIII.

GRAPE GROWING IN SOUTHERN OHIO.

BY GEO. W. CAMPBELL.

DELAWARE, O., *Nov.* 25, 1879.

George Husmann, Esq.:

DEAR SIR.—Your favor of last month, asking from me some notes upon grapes, reached me at a time when I was so much occupied that I was unable to give it the attention I desired, and it has, therefore, lain unanswered longer than I intended.

My experience with grapes, as you know, though extending through many years, and including a large number of varieties, has been mainly that of an amateur or experimentalist; for though I have grown the vines largely in a commercial way, I have never made the growing of grapes an important consideration, beyond what was necessary to ascertain their character, quality, and comparative value.

This portion of Central Ohio is not specially favorable for grape growing, being subject to great extremes, and often sudden changes of temperature. Frosts, late in spring, often injure, and sometimes quite destroy the grape crop about the time of blooming and setting of the fruit. And we usually have frosts so early in autumn that only the early and medium-early varieties can be relied upon to mature. I have never seen either Catawba or Gœthe perfectly matured here in fully exposed, open-air culture. A range of temperature from 98° in the shade in summer, to 25°, and even 30° below zero in winter, is also extremely trying, and none, except the hardiest varieties of grape vines, can endure such a climate without winter protection.

Mildew of the foliage and rotting of the fruit, are, I think, less prevalent here than in many other places which are more favorable for grape growing in other respects. I mention these things, as tending to form or modify my opinions upon the character and value of varieties, believing you would better appreciate my views by having a pretty full understanding of the conditions under which they are formed.

Grapes may be properly divided into two distinct classes: First, those that are, by their hardy and healthy character, adapted to general cultivation; and second, those that are only suited to special or particular localities. These might again be sub-divided into grapes for special uses, as for the table, and for wine making; but I can not, in the limits of this brief communication attempt anything like a classification of varieties, as I presume you have already done this in a manner far beyond my capabilities.

As in most parts of the country, the Concord grape has been more extensively planted here than any other, and upon the whole, it may be said, its success has been greater than that of any other variety. For many years after its introduction it was exempt from both mildew and rot, yielding regular and good crops. It is still free from mildew of the foliage, but in unfavorable seasons, when there is an excess of rain with much warm, sultry, foggy weather about the time the fruit approaches maturity, in common with most other varieties, it has suffered seriously from rotting. The season just past has been a favorable one, and except where the vines were injured by the extreme severity of the previous winter, they have borne healthy and well matured crops.

From the Concord have been grown many seedlings, some of which have attained considerable popularity, and will, doubtless, prove permanently valuable for the sections where this class of grapes are most successful.

Among the most prominent of these are Martha, Eva, Lady, Worden's Seedling, and Moore's Early, the first named three being white, and the latter two black varieties. The Martha is, perhaps, too well known to need special description. Eva is a twin-sister of Martha, and the two are much alike. Several intelligent growers, however, are positive that they are quite distinct, with preferences for Eva, especially as to quality.

THE LADY grape is quite distinct from the above, or any other Concord seedling that I have seen. It is specially remarkable for healthy growth, hardiness, very early ripening, and quality superior to any of its class, or to any other grape ripening at the same time. I believe it, is generally conceded to be the best very early grape yet introduced. It ripens here from the 10th to the 20th of August, or two to three weeks earlier than Concord. In color, it is what is usually called white, but is a light, yellowish-green, and amber-tinted when exposed to the sun. In size the berry is fully as large as Concord, clusters somewhat smaller. In flavor more delicate than Concord, as well as more vinous and sprightly. Its growth is compact and healthy, often a little slow for the first year or two, but constantly increasing in vigor, and my older vines, growing in a stiff clay, are all that I could wish, and make as strong and healthy vines, and as much wood as any Concords I have. It has been noticeable here that all the white seedlings from Concord have been much less disposed to rot than their parent. Neither Martha, Eva, nor Lady, has ever been seriously affected by this malady, and they have usually escaped entirely when Concord has suffered badly. I regard the Lady grape as chiefly valuable as an early grape for home use and for near market. The skin is quite thin, and would not bear rough handling, or shipping to distant markets, without great care. It has not been to my knowledge tested for wine making, but I believe it will be found su-

perior to the Martha for this purpose, apparently having more vinous acid.

WORDEN'S SEEDLING I regard as an improvement upon the Concord, being earlier, handsomer in bunch and berry, and, to my taste, better flavored. The vine is vigorous and healthy, and though a little weaker at first, when well established it is equal to Concord, and fully as productive. It ripens here a week or ten days before Concord, and is certainly one of the most promising of its class.

MOORE'S EARLY is, in many respects, similar to Worden; both Concord seedlings, and in general habit of growth and appearance closely following the parent stock. This variety has been, I think, greatly misrepresented as too early. I fruited it the past season and found it not more than ten days earlier than Concord, instead of a month, as had been claimed. There was scarcely any difference in time of maturity between it and Worden, and I could not see that Moore's Early was, in any respect, superior to it. It is but just to say, I have only fruited it one season, and upon but two vines, and my observations are made by comparison of the performance of the different kinds the past year.

THE BRIGHTON grape has been extensively planted, and is quite prominent before the public as a promising new variety. I have seen very handsome and good grapes on exhibition from the introducers of it, but neglecting to give it winter protection it has been killed to the ground two years in succession, and I have not yet had it in fruit. The vine is vigorous in growth; in general habit and appearance much like some of Rogers' Hybrids, and I think, will succeed wherever Rogers' grapes can be profitably grown.

PURITY.—The grape which I have named "Purity," I yet have hopes may prove valuable, for it still maintains

its progressive character, improving in size of bunch and berry every year. The vine is a very strong, hardy, and healthy grower, making heavy, short-jointed canes, and large, thick foliage. In quality and flavor, the best of all the native grapes I have ever grown, Delaware not excepted. It more resembles, in flavor, the foreign grapes of the Frontignac family, than anything I can compare it with, although it is, in every characteristic, a pure native of the hardiest and healthiest type. Its one fault is want of size, in both bunch and berry. Its clusters are beautifully formed, never crowded, and never loose. In size, the berries were the past season perhaps a little larger than Delawares, the bunches averaged less. The parent vine made a remarkably strong growth the past season, and I think may now be considered as fully developed. It has proved abundantly productive, and if my hopes and expectations, as to improvement in size, are realized the coming season, I shall probably introduce and offer it as a new and valuable variety. The Delaware is one of its parents. As to the other, I am not certain whether it was Catawba or Martha.

THE DELAWARE is still grown in this neighborhood, and is, perhaps, more planted than any other variety after the Concord. Mildew of the foliage, and its tendency to overbear, are the only drawbacks to its successful culture. Its entire exemption from rot, even in the most unfavorable seasons, and under both neglect and ill treatment, is something remarkable, and where mildew of the foliage does not prevail, the Delaware may be regarded as one of our best, most reliable, and most profitable grapes. And where grape growing is pursued with reasonable skill and intelligence, the proper use of Sulphur will control the mildew, and the timely exercise of brains will prevent the evils of overbearing.

THE ELVIRA has many good qualities, but I think will be of more value as a parent stock, from which new and

improved varieties will spring, either by seedlings or by cross fertilizing with other natives, than in its individual capacity. I find it quite healthy, and among the hardiest, as well as most productive of American grapes; free from foxiness, but as grown here, rather negative in character, with always something of the immature flavor which characterizes the Taylor. In southern latitudes it is, doubtless, higher flavored, and valuable for wine making, and perhaps also for the table. Its great fault seems to be, excessive crowding of the berries in the clusters, which, accompanied with a thin and tender skin, causes the berries to crack and rot in the most wholesale manner about the time of ripening. This evil can be remedied by severe thinning out of the berries, but this involves an amount of labor which would not be undertaken with our present views of vineyard culture.

The past season seems to have been unusually prolific in the exhibition of promising new varieties, and although time must be required to determine their true value, I think it evident that advance has been made in the direction of substantial progress. The Noah grape seems to be a decided improvement upon the Elvira, having apparently all the merits without the serious faults of that variety.

At the meeting of the American Pomological Society, at Rochester, in September last, several very handsome and attractive new varieties were shown, which will soon be offered to the public, and which appear to have sufficient merits to render them worthy of extensive trial; among these were:

NIAGARA, a large white grape, of good quality, with heavy and apparently healthy foliage, and said to possess great productiveness and vigor of growth, was among the most promising.

POCKLINGTON, another white variety, claimed to be a

REESE LIBRARY
UNIVERSITY OF
CALIFORNIA

Concord seedling, had very large and showy clusters of yellowish-white grapes, medium in quality, but very attractive from the unusually large and handsome bunches.

PRENTISS, another white variety closely resembling the Rebecca both in appearance and quality, but showing wonderful productiveness, and claimed to be of healthy and hardy growth, was quite noticeable.

LADY WASHINGTON, claimed to be a cross between Concord and Allen's Hybrid (white), was both handsome and good; white, and with very large clusters. It is one of the most attractive, and probably one of the best of Mr. Ricketts' many new varieties.

JEFFERSON, a handsome new grape, claimed to be a cross of Concord and Iona, resembling the latter variety, was very pure in flavor, and even finer than Iona. Will be found very valuable if the vine is hardy and healthy.

There were also several other interesting and handsome new grapes in Mr. Ricketts' collection, the value of which can only be determined by further trial.

I think, judging from some years' experience with them, that some of Mr. Stephen Underhill's hybrid grapes are worthy of more attention than they have received. The Croton grape is fully as healthy and hardy as Allen's Hybrid, more productive, and of finer quality. Irving is very large and showy, a strong grower also, as well as productive, and of very good quality; as hardy and healthy as most of the hybrids, and for an amateur grape very desirable.

Two black varieties, of the same originator, named Black Eagle and Black Defiance, I believe, will be found desirable wherever hybrid varieties can be successfully grown.

I received also, the past autumn, early in September, two samples of new seedling grapes from the Delaware, which I consider worthy of mention, as promising to be

valuable acquisitions. The first, named "Mabel," from Freeport, Illinois, is like Delaware in color and general appearance, but with larger clusters and larger berries. It has much of the Delaware character and flavor; the foliage is thick and heavy, and said to resist mildew as perfectly as Concord.

The other is a white grape, from Camargo, Illinois, named "Willis," of good quality and handsome appearance, about the size of Delaware.

There is another class of grapes of which the Hartford Prolific is the prototype, that I should be glad to see discarded from all lists, as unworthy of cultivation. Their only merit, in my judgment, is earliness in ripening—and their wretched quality is calculated only to disgust those who are tempted by their early appearance in the markets. In the same category may be placed Janesville, Belvidere, Whitehall, Talman, and several others, which should not be tolerated where anything better can be grown.

I have perhaps extended my remarks as far as may be desirable to you, and you are at liberty to make such use of them as you please, using or omitting any portion you may deem useful or otherwise. I can not, however, close without a word of congratulation and encouragement, arising from the fact that sufficient interest is taken in the subject of grape growing to call for a new work upon grapes. I think there are other indications that this great and important industry is reviving, and will again, at no distant period, occupy a prominent position among the horticultural pursuits of our country. The evidently increased interest taken in the discussions upon grapes and their culture, at the last meeeting of the American Pomological Society, was especially noticeable and gratifying to all lovers of this noble fruit. With my best wishes for your success, I am, very truly, your friend and co-laborer,

GEO. W. CAMPBELL.

CHAPTER XXIX.

GRAPE CULTURE AND WINE MAKING IN OHIO.

BY M. B. BATEHAM, SECRETARY, ETC., PAINESVILLE, O.

The history of grape culture and wine making in this State may be said to have commenced about thirty years ago, when Nicholas Longworth and a few other citizens of Cincinnati, devoted themselves, with much energy, to the planting of Catawba vineyards, on the clayey hillsides in the vicinity of that city. These vineyards, embracing several thousand acres, were, for a few years, so successful as to encourage liberal investment of capital and skill in the business of wine making, and in a little time "Longworth's Sparkling Catawba" and "Golden Eagle," became widely known as popular brands at fashionable dinners.

But in a short time that fell scourge, the Rot, began to make havoc in their Catawba vineyards, and after repeated failures of the crops from this cause, they were generally abandoned. Then followed the death of Mr. Longworth, and his wine business was given up by his heirs, though other parties have continued it in the city. It was found that the Ives Seedling grape resisted the attacks of mildew and rot, and made a good quality of cheap wine, hence it was largely planted in that vicinity; but in a few years this also succumbed to the rot and was mostly abandoned. In the meantime several of the wine makers planted Catawba vineyards on the Lake Shore, in Erie County, or made arrangements with vineyardists there to send them annual supplies for their cellars.

Owing to the general exemption from mildew and rot of the vineyards on the Lake Shore and the Islands, much planting was done in that region ten to fifteen years ago,

not less than 5,000 acres were set in three or four years. But much of this planting was unwisely done—on badly chosen soil and with little preparation—so that nearly one-half the amount never paid the cost, and was sooner or later abandoned. In many parts of the interior of the State, smaller vineyards were also planted in those years, mostly of the Concord variety, the fruit designed chiefly for market. In a few hilly localities in the south-eastern quarter of the State, vineyards of moderate extent are cultivated successfully for wine; the varieties, Catawba, Norton, and Ives. Within the past three or four years many of the Concord vineyards, which had previously been quite successful, have had their fruit destroyed by the rot, so that the owners are much discouraged, and some have grubbed out their vines.

With all these causes of failure, I believe there have been destroyed not less than 10,000 acres of vineyards in Ohio during the past ten years; and during the same time there have been planted, perhaps, 7,000 acres—leaving the aggregate at this time about 9,000 acres, or 3,000 less than it was eight or ten years ago. Several hundred acres of Catawba vines are annually planted on the Islands—enough to make up for any that fail from age or other causes. Some planting is also done every year in the more favorable districts along the Lake Shore and in the interior.

The past season was more exempt from mildew and rot than for several years previous; though a few localities suffered badly, from the effects of rainy and sultry weather in July, this was not of very wide extent. The warm weather of autumn ripened the Catawba better than usual, and a superior quality of wine is the result. The price paid to the growers on the Islands by the wine makers, was 4 cents per pound, by the ton, for good Catawba; second class, $3^1/_2$ cents.

About half of the vineyards of our State, or over 4,000

acres, are located on the Islands and the western part of our Lake Shore. Of these, about seven-eighths are Catawba, the rest are Delaware, Concord, Norton, etc. More than three-fourths of the fruit is used for wine; some is shipped to the city markets for table use. The crops are somewhat variable in amount and quality, and sometimes damage is done to the vines by the winters, or to the foliage by mildew, so that the fruit fails to ripen perfectly. Still, as an average, the profits are considered better than could be realized from any other use of the land. The price at which good vineyard locations on the Islands can now be bought is higher, I am told, than for several years past, ranging from $200 to $400 per acre.

Our statistics of the amount of yield per acre of our Island vineyards, and the amount of wine pressed annually, are not very full or reliable. The assessor's returns show that the aggregate of wine for the State ranges from about 500,000 to over 1,000,000 gallons. The returns as published for 1878 are 708,733 gallons, and the number of pounds of grapes gathered, 10,341,715. The entire statistics for that year for the two counties of Ottawa and Erie, which embrace the Islands and portions of the Lake Shore, are as follows:

COUNTIES.	*Acres of Vineyards.*	*Pounds of Grapes.*	*Gallons of Wine.*
Ottawa.....	1,900	3,448,103	318,707
Erie.....	1,271	1,924,275	151,133

These figures are somewhat below the average yield of the past ten years, and only about half as great as those of exceptionally good seasons. The crop of 1879 was about equal in amount to that of 1878, and superior in quality.

PAINESVILLE, O.

CHAPTER XXX.

GRAPE CULTURE AT KELLEY'S ISLAND, OHIO.

BY ADDISON KELLEY.

This Island has some 650 acres in bearing vineyards, probably nine-tenths of the vines are Catawbas; Concords are next in quantity, being near half of the remaining tenth; then Isabella, Delaware, Ives, Nortons, Hartford, Wilder (Rogers' No. 4), Clinton, and Oporto. There are some fifty other varieties, but only for amateurs and on trial. The land is prepared for setting by under-draining, by means of ditches from $2^1/_2$ to 3 feet deep, with hollow drain, made mostly with thin, flat surface stone, set up on the bottom, as in figure 24,

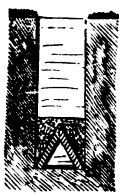


Fig. 24.

Fig. 25.

and covered. Another kind, called the "Shoulder drain," is made as in figure 25, and covered or filled in with the earth that was thrown out; distance apart, 32 or 40 feet, or in fourth or fifth rows.

A few vineyards have tile-drains. Some vineyards have natural drainage, the rock (limestone) being cracked into open seams, with heavy marl over it, from 1 foot to 3 feet deep; this proves to be the best drainage.

Roots one year old are usually planted. Where the soil is suitable, cuttings have proved as good as roots. They are put two in a place. Those that grow are quite as good as roots. Where both live, one is removed. The most common distance for planting is in rows 8 feet apart and 6 feet in the row. The vines are cultivated like corn, for one, and sometimes two years, before trellising. The second year the vines are cut down to two buds, in the usual way. For trellising, posts are set, one to every four or five vines,

according to taste and size of posts; 7½ or 8 feet posts are used, set 2½ feet in the ground. The oldest vineyards have mostly No. 9 wire, but latterly No. 11 is considered sufficient. Three wires, of the best annealed iron wire only, are used, the lower wire is 2 or 2½ feet above the ground, the other two equally divide the distance between the lowest wire and the top of the trellis. Good, clean cultivation is required afterwards. I usually plow two or three times, and take care to cultivate well during the season. The first plowing is done in the spring as early as the ground is fit, after trimming and tying up the vines to the wires, with willow twigs, raised for the purpose. They are then hoed with pronged hoes, and surface roots cut off to the depth of 4 to 6 inches from the surface of the ground.

The third year, or first bearing year, the vines are cut to two branches and one spur of two buds, the bearing branches have from six to nine buds each, according to fancy and strength or size of cane. No summer-pruning is allowed by any one now, I think, except to break off any excess of suckers at the bottom, leaving one or two only for next year's spur. Summer-pruning injures the fruit both for wine and for the palate.

There were raised here in 1879, between 1,350 and 1,400 tons, of which not more than 40 tons were shipped for table use. The balance was made into wine; about 100 tons were sold or sent elsewhere for wine. The Kelley Wine Company bought and made up about 9,000 tons; average price paid for: Catawbas, 3½ cents; Concords, 2 cents; Delaware and Nortons, 5½ cents; Oporto and Clinton, 3 cents; Ives, 2¾ cents; Isabella, 1 cent. The crop on the Bass Islands—South, Middle, and North Bass, was as good as here. The acreage being more than here, probably amounting to 800 or 900 acres, and some larger, proportion shipped for table use. I have no statistics.

The crop was good on the Peninsula, 4 miles south of this place, while it was poor on the Lake Shore mainland, particularly east of here, in consequence of what is known here as "Greeley Rot," so called from its making its first appearance the year in which Horace Greeley run for President.

There are a number of vineyards here on the northeastern part of the Island that suffer badly by it, and it is working southwest slowly every year. The berry has the appearance of having a sting, showing a dark speck and turning white immediately around it at first, then turning brown as it spreads; the berry then becomes black (not distinguishable from one attacked by mildew), rots, dries up, and falls off, or is easily shaken off. There are often two or more of the spots on one berry.

The magnifying glass, or even microscope, does not disclose any egg or any puncture through the skin. If the speck is cut out or taken off with a sharp knife, the wound heals over, and no damage is sustained by the berry. In several vineyards here the damage caused by it is as great as that from the Phylloxera or mildew. I see that Prof. Riley claims that Phylloxera does not cause rot. Certainly high authority. It is true that mildew always precedes and accompanies rot, but we never had rot before we had Phylloxera; and we do not now have mildew unless the insect is plenty enough to destroy all the new rootlets. May it not be that the Phylloxera causes mildew, and mildew rot? The mildew only makes its appearance between the 24th and 28th of June the first time any year. If it does not come then, no fears need be entertained of its striking before the 24th to 28th of July. We had none this year before the latter period, when there was a rather light attack. August 24th to 30th it was more severe, and the August rot always continues with more or less severity until the fruit is made up or consumed. The Phylloxera on the

roots were fewer than for five or six years past, or ever since I have examined them, and there was less mildew and rot.

I have not examined the roots of vines having the "Greeley Rot," for Phylloxera, but shall make it a point to do so this year. My vineyards not being much effected by this rot, I have not looked after the matter as much as I should have done.

The only remedy tried here for *Oidium*, or mildew rot, that any success is claimed for, is Sulphur; one part sulphur and two parts fine lime or plaster, are well mixed 24 hours or more before using. The lime, or plaster, is for the purpose of neutralizing the acid in the sulphur. This proportion is used for the first application, afterward equal parts of each; it is blown on by bellows, and as much upon the underside of the leaves as possible.

I think any application of this, other than from 22d to 26th of the months of June, July, and August, proves worse than useless.

The weather has little or nothing to do with this rot; it clearly is not climatic. It always comes here at these periods named, if it comes at all, and no one can tell by the weather if it will come then or not. Hence the saying obtains here: "It comes from pure *cussedness.*" I examined the roots of my gooseberries that mildewed. I found them all badly diseased, the fine roots entirely dead. Is this always the case? The kinds of grapes having the most Leaf-Phylloxera, or Leaf-gall, are most exempt from mildew. The Oporto and Clinton are free from mildew and rot, and also free from Phylloxera on the roots. I grafted Iona and some other varieties that are subject to mildew rot, on Oporto roots. They did well for about three years, then mildewed the same as on their own stocks; the roots also were infested the same, with Phylloxera. I grafted alternate vines in the row below the surface of

the ground. The alternate Oportos not grafted remained exempt from the insects and mildew rot. The Concords suffer but little from mildew rot; but the "Greeley rot" does not spare it, or any other kind of grapes. It seems to be "no respecter of persons," where grapes are the persons.

CHAPTER XXXI.

GRAPE-GROWING AND WINE-MAKING ON LAKE KEUKA, OR CROOKED LAKE, STEUBEN CO., N. Y.

BY THE AUTHOR.

On a flying trip made last fall to the famous grape region on what was formerly called Crooked Lake, a name which the residents have since changed to Lake Keuka, I gathered a few items of interest, convincing me that there is indeed a great opening here, and I will give my readers such notes as a hasty visit of hardly two days enabled me to take. I regret that the superintendents of the leading wine companies (the Pleasant Valley and Urbana) did not furnish me with fuller data.

There are about 6,000 acres of grapes on the shores of the lake, but the chief vineyards are between Pultney and Hammondsport—a distance of about 9 miles, which is an almost uninterrupted vineyard. There is quite a large cellar at Pultney, where I did not find time to stop. A few miles above Hammondsport are the cellars of the Urbana Wine Co., an imposing stone structure of three stories above the vaults, and 56 feet wide by 100 feet long, to which have since been added 2 wings, 4 stories in hight, of 40 by 80 feet, thus doubling their capacity. I suppose they could conveniently store and manufacture 400,000 gallons of wine, outside of the

Champagne vaults, and have all the appliances in the shape of good cellars, casks, fermenting vats, and presses, to handle the grapes of half the neighborhood, besides the product of their own vineyards of about 100 acres, which produced about 170 tons of grapes last season. The grapes I saw made into wine there were very fine indeed, and should produce a superior article. Mr. Bricaut, their present wine-maker, acquired his experience in France, and he certainly makes fine sparkling wines, as the many awards taken by their products in this country and abroad, abundantly testify. From statistics furnished me by Mr. Clark Bell, the Vice-President of the Company, the sales of the Company, during the last year amounted to about $105,238, of which $78,192 were still wines, $24,702 sparkling wines, $2,343 in Brandy. The price paid for grapes ranged from 1c. to 4c. per pound, of which Isabellas rank lowest, then Concord, then Catawba, then Diana, Iona, and Delaware highest. Their best wines are used mainly for Champagne, and the majority of other wine sold is Sweet Catawba, a wine I do not much admire. I am convinced, however, that a very superior still wine could be made from the grapes grown there. The vineyards are mostly let to men who work them on shares. They need good, red-wine grapes to make Clarets and Ports, and to judge from a sample of Nortons I tasted, which had been made there, I have no doubt they could be made.

The Pleasant Valley Wine Co. is located at Rheims, a few miles back from Hammondsport. Mr. Jules Masson, an old acquaintance whom I met at Cincinnati in 1869, then in charge of the Longworth Wine House, is Superintendent of the cellars here. Mr. D. Bauder is Secretary of the Company. I paid but a flying visit to their cellars, and could not look around much, but saw enough to convince me that the two Companies are worthy rivals. From notes furnished me by these gentlemen I gathered that

in 1878 they had handled about 800 tons of grapes, and made 130,000 gallons of wine, of which 20,000 were manufactured into sparkling wines. They expected to handle about 1,500 tons of grapes during 1879, and to make something like 200,000 gallons of wine. The prices of both establishments seem to be about the same, $12 to $14 per case for sparkling, 70c. to 90c. per gallon for still wines.

These represent but two of the main industries of that region. It may be safe to say that 500,000 gallons of wine are annually made there, and that fully one-half of the grapes, if not two-thirds, find their way to the markets of New York, Philadelphia, Baltimore, Boston, and other large cities, for I saw them everywhere, and in such good condition, and at such low figures, as to place them within reach of the laboring classes. The steamers which make round trips every day, from Penn Yan to Hammondsport, one in the morning, and one in the afternoon, and which land at every pier and every vineyard where they can pick up freight and passengers, transport an immense quantity of grapes, at very low rates, and at the same time afford a convenient and pleasant opportunity for tourists and visitors. I have no doubt that this and the neighboring lakes, with their beautiful scenery, and their many facilities for a pleasant summer resort, will, in time, become as famous for their "grape cures" as the Rhine and the Moselle are in the old world. They are within easy reach of all the crowded cities of the East, and to thousands will prove a more pleasant, because more quiet and rural, retreat during the hot months, than Saratoga. This is another phase of American grape-growing, but little developed as yet, and which has only to become fashionable, to be fully appreciated.

CHAPTER XXXII.

GRAPE GROWING IN SOUTHERN TEXAS.

BY G. ONDERDONK, MISSION VALLEY, VICTORIA CO., TEXAS.

The following extracts from several letters to the author, give Mr. Onderdonk's experiences and views in his own language :

[FROM LETTER DATED JULY 19, 1876.]

Mr. George Husmann :

* * * The Department at Washington sometimes gets things confused as well as other people, as, for instance, when it reported the "Warren" and "Herbemont" under different classifications; yet, I believe the Department is generally correct as to names. We are all subject to confusion in the nomenclature of grapes. The grape at one time disseminated by some as the "Lenoir," and by others as the "Devereux," is the one I now send out as the Black July. I have procured it from the best establishments under these different names, and tested their identity on my grounds. I afterwards found that Berckman's, of Augusta, Ga., had a "Lenoir" grape. I ordered it at once, and this is the Lenoir of my nursery. The Lenoir and Black Spanish, the former originating in South Carolina, the latter in Natchez, Miss., entirely resemble one another in foliage and habit, and in fruit differ only in flavor, and sometimes, and during some seasons, I almost believe them so nearly identical as not to be worthy of a distinction (like the Warren and Herbemont, of distinct histories, yet finally treated as identical). My Lenoir, in the soil where it stands, is sweeter than the Black Spanish, or rather is less acid (for neither of them can be called sweet). They are both excellent bearers here, and neither will rot.

The Devereux, or Black July, has foliage very distinct from the Lenoir. The bunches as small, scarcely ever shouldered, and sweet, is also several days earlier than the other two. It must be used immediately when ripe, or it will rapidly decay. It is a shy bearer, and should rest even at that. My Black July is now ripe and gone, and are usually gone a week earlier than now. My Black Spanish are hardly ripe, but will do to market now. I have a plenty of bunches that will weigh a pound each, without resorting to special care to secure specimens, and I think I could get quite a number of Black Spanish bunches on every vine that would weigh 24 ounces. Of the Devereux, or Black July, I doubt if I ever made three bunches that would together weigh a pound.

I give these data carefully, because I am aware of the confusion about these varieties, and wish to do my little share towards correcting our nomenclature.

I did not try the Elvira, because I had so signally failed with its parents. In fact I do not feel much encouragement to experiment outside of the *æstivalis* family for this region, and give large preference to the southern branch at that. Having carefully watched, on a small scale, on my own grounds, every family of grapes, including about 65 varieties, I have concluded that we must get our grapes from the southern branch of that family.

The Pauline and Cunningham have suddenly become unthrifty, so that cuttings were scarce at the last pruning. I speak of the old vines. The few young vines are thrifty. The Cunningham grows so very compact upon the bunch that the berries break each other, and cause rot. For a year or so I have not been disposed to increase my small stock of these two varieties. The Black Spanish and Warren continue to beat everything else here, and are established beyond dispute to be, thus far, our grapes. I do not exclude the Lenoir, which acts in every way like the Black Spanish.

UNIVERSITY OF CALIFORNIA

In my grape culture I have kept two objects in view: 1st., to test such varieties as I deem promising, and 2d., to raise only enough to supply local demands for the fruit, and sufficient wood for my nursery. I had only aimed at local trade until last year's demands from France had induced me to plant cuttings to make plants for that market. If I thought that the French demand would continue I would make preparations to meet it, but I think they will soon raise their own plants and become independent of us. There are small vineyards scattered about, from which cuttings could be obtained for shipment; but that is out of my line, and I could only operate through the vineyardist, as my business presses at the cutting season.

[FROM LETTER DATED JANUARY 15, 1877.]

* * * I will try the Elvira. If it roots deep like the *æstivalis* I shall expect its success, unless it ripens its leaves too early. But I had so fully made up my mind that our grapes had all to come from the *æstivalis* family, that I had ceased to make experiments with anything else. If the Elvira is related to that family I should hope for something from it. But I will try it anyhow.

Some facts connected with the growth of the *Labrusca* and *æstivalis* varieties, have led me to think sometimes that the prime reason for the want of permanent success here with the *Labruscas*, was their habit of rooting so near the surface. The *æstivalis* continue to grow luxuriantly through our long, hot, dry summers like cucumbers in rainy weather. On the other hand the *Labrusca* varieties, without exception, take such a rest in the summer, that I have successfully removed them in August, when they are quite uniformly leafless. The September and October rains generally start the *La-*

bruscas into a full growth here. But even during rainy summers the *Labriŝcas* cannot grow all summer. Their leaves attain maturity and must fall. I conclude, after all, that while the habit of shallow rooting with the *Labruscas*, readily suggest this as a reason for want of adaptation, that it is not the only reason. I should say, in general terms, that every portion of the plant matured in a shorter length of time than is required in the case of the *æstivalis*, that the *Labrusca* requires a longer period of rest than the *æstivalis*. Our climate will not give them this rest, and, therefore, the plant gives way. The Almighty has provided plants for the different latitudes, adapted by their constitution to their proper climates. When these plants are removed to a point where the climate does not harmonize with their constitutions, then they must yield to the violence against their natures. Whether the lower temperature during the growing season at the North prevented development, or the frost of the northern winter extinguishes life, or whether the long continued demands of a southern climate enervate, and finally destroy the life of a plant, the final result is the same. Climate will govern the limit of our vegetable productions.

If we will apply these views to grape culture, it will be seen that Nature has fixed her bounds in the constitutions of the different families of grapes. The experience of man must point out the limits fixed by the Creator's hand, and written upon and within every family of the vine.

The shallow roots of the *Labrusca* can be warmed by the northern sun, but they are too much heated by the sun of our climate. The brief seasons of the North can ripen the different parts of the *Labrusca*, and then give the plant repose; but our long seasons, first develop and then stimulate to exhaustion, the same family of grapes. Thus we fail with the *Labrusca*. I think that the want

of climatic adaptation of the *Labruscas* here, extends to every portion of their structure. They start off beautifully and promise well for a time, but after two or three annual crops, they rapidly decline, showing every sign of premature old age. The southern limit of this family could be learned by a careful system of correspondence. Mr. E. W. Krausse, of Waco, a careful experimenter, has an experience with them similar to my own, and agrees with me in his conclusions. It appears also that the *æstivalis* of the Norton type are successful at Waco, three hundred miles north of me. Here, I have not succeeded with them, I call them, for convenience, the Northern *æstivalis*. Those of the Herbemont type, belonging to the Southern group, seem to succeed anywhere North where the winters do not freeze them out. There are flourishing vineyards of the Herbemont, from my nursery, a hundred miles south of me. The Lenoir was planted there at the same time, but the Herbemont (Warren) has driven the Lenoir from these vineyards, as the former is there found every way superior in fruit, though only equal in vine. Texas is the true home of the Southern *æstivalis* varieties of the grape. They endure both extremes of heat and cold, to which we are subject, and no drouth, however severe, can affect the plants unfavorably when they are once established. They must be allowed a plenty of wood in pruning.

[FROM LETTER DATED FEBRUARY 23, 1877.]

* * * The Clinton and Golden Clinton are the only *cordifolia* varieties that I have tried here. They died during the sixth year, having produced two good crops. My own theory has been, and yet is, something like this: That the Southern *æstivalis* must furnish the grapes for the *extreme* South, either by itself or by hybridization on

Southern natives. That the northern limit of the Southern *æstivalis* is governed by the isothermal line beyond which it is killed by the cold of winter.

That the Northern *æstivalis* will flourish still further north, because it endures a lower temperature, but will give poor results in the extreme South, yet will do well in the northern portion of the Southern *æstivalis* belt.

That the *Labruscas* belong still north of the Northern *æstivalis*, but will thrive in the northern portion of the Northern *æstivalis* belt, while below that region it will appear successful for a time, but decline after two or three crops.

That the *cordifolia* will succeed in both the *Labrusca* and Northern *æstivalis* belt, but will fail in the southern portion of the Southern *æstivalis* belt.

That these families of grapes will give first class success only in their climatic bounds, not because of any one peculiar feature in their growth, but because of their construction throughout the various parts of their being.

And finally, that these families of grapes must (with allowances to be made for different degrees of humidity) become the grapes for the whole world.

I will qualify the above by placing the *rotundifolia* in the southern part of the Southern *æstivalis* belt.

I believe that if your experience and my own were upon the same ground, we should agree throughout. I am aware that this is rank heresy, or would be treated as such by the old school of horticulturist. Very good, they are my convictions. If you bring this thing before the public, or if I should do so myself (as I have thought I would do), it will encounter a storm. But men like Bush, Jaeger, and I will add, Prof. Krausse, of Waco, Texas, and other unpretending students will grant a friendly reception, and time will confirm the matter. I am fighting upon that line myself, and am glad to find another, and I may add, many others, upon the same side.

I began grape culture by following the old methods. I have learned to see that their teachings may do in New York or New England, but is inapplicable in this country. They see matters as they appear in their climate. They want *Labruscas* and their hybrids. We do not.

CHAPTER XXXIII.

THE GRAPES OF SOUTHERN TEXAS.

BY G. ONDERDONK.

MISSION VALLEY, TEXAS, *August* 18, 1879,

Mr. George Husmann:

DEAR SIR.—I write in reply to yours of July 25th, concerning the grapes of Southern Texas.

THE MUSTANG (*Vitis candicans*) is scattered profusely in every variety of situation and soil all over Southern Texas. It comprises many varieties differing in form, color, and season of ripening. The fruit is from large to very large; some varieties attaining the size of the Gœthe. The prevailing color is black. It is remarkable for the great thickness and excessive acidity of the skin. The pulp does not contain more than a fair share of acid, but is quite destitute of sugar in all of its varieties. By the addition of two pounds of sugar to the gallon, it makes a wine of some reputation.

THE POST OAK GRAPE (*V. Lincecumii*, of Buckley), does not grow in this region.

THE BUSH GRAPE (*V. rupestris*) is here confined to the mountains. It is a small, scrubby grower, and bears only once in three or four years. The leaves remind one of the *rotundifolia*. It is not found in the valleys, and

will only succeed in the most limy barren soils, where nothing else will grow. All attempts to raise it in the coast region have failed, and yet I suspect that its failure with us has been a matter of soil, and not of climate. Having a small spot just like the soil of the mountains I mean to test the matter. While it is true that this species is quite worthless for cultivation here for the fruit, yet as it its roots seem to be proof against Phylloxera, it may be found valuable as a stock for the *vinifera*. Some interesting experiments are in progress, with a view to this use of the *rupestris*. Four-year-old grafts are yet highly promising. There is hope that by using the *rupestris* as a stock, we may yet succeed with some of the European varieties in spite of the Phylloxera, wherever we can command the required soil. This experiment is also being made in France with strong hopes of success.

THE SOUTHERN ÆSTIVALIS, not native here, must furnish the main supply of varieties for Southern Texas. Twenty-five years ago but few residents of this region believed it possible to succeed with any variety of cultivated grapes. Mr. J. M. Voigt, then a resident here, and since of Hermann, Mo., began the first systematic, persistent experiments, with which I became acquainted in about 1855. He mostly cultivated Catawba, and extended his experiments to about thirty-five varieties. I began similar experiments in 1858. I experimented with every class that has been reduced to the service of the vineyardist. The result was that I found nothing to give permanent success outside of the southern branch of the *V. æstivalis*. We call it Southern *æstivalis* for brevity, without assuming authority to fix a designation. I abhor a multiplication of unnecessary classifications. But the forces of Nature have driven us to a distinction between what a few of us call Northern and Southern *æstivalis*; and the very singular climate of Southern

Texas forces a local recognition of a further sub-division for practical local use. But I have not the audacity to imagine the propriety of a general acceptance of this sub-division for the country at large.

The members of the Southern *æstivalis* class, which may be represented by the Devereux, Louisiana, and Cunningham, have grown off beautifully here, but have borne lightly, and, except the Devereux, have rotted badly, and all have proved short lived. I think that these varieties belong a very little further north.

On the other hand, the Herbemont and Lenoir are here perfect in every respect, taking a very decided precedence over all other tested varieties. We have two new varieties of what I shall here, for convenience, call the Herbemont Division. First, the Harwood, which is simply an enlarged Herbemont. Second, the Dunn grape, which is a little larger than Herbemont, considerably paler, and a few days later. I have been watching the original Harwood vine for ten years, and am led to place an increased value upon it. I regret that it is not very successfully propagated by cuttings. My attention has but recently become directed toward the Dunn grape. But from the very close resemblance in foliage and habit which both of these varieties bear to the Herbemont, which is our most successful grape, I feel as sure as one could do, short of a complete demonstration, that these varieties will both prove to be treasures. Both will be thoroughly tested and offered to the public.

G. O.

EMORANDA FROM M[R]. ONDERDONK.

CUNNINGHAM (of Berckmans).—Pale amber, generally shouldered, very compact; was discovered wild by Judge Long, near Athens, Ga. Downing describes Cunningham as "black."

BLACK JULY (Berckmans').—Also known as Devereux, Lincoln, Sumpter, Sherry, Blue Grape, Thurmond, McLean, Tully, Husson, Hart (Lenoir incorrectly). It has been found wild in various places in Georgia and Alabama.

LENOIR (Berckmans').—Burgundy in Eastern Texas. Black Spanish in Western Texas. May possibly be the Jacques of Mississippi—possibly the Cigar Box, or Ohio of Longworth, but I do not believe it. I shall be able to settle this question in a couple of years. Berckmans got this Lenoir from Dr. Decaredeno when the variety first came out from Lenoir County, South Carolina.

CHAPTER XXXIV.

THE VINEYARD IN TEXAS.

BY G. ONDERDONK, ESQ., OF MISSION VALLEY NURSERIES.

(*From Burke's Almanac*, 1878.)

It was written of the different classes of grapes by an eminent Northern Pomologist, a few years ago, that "Practically it is of little consequence what view is taken of these usual forms, * * as the cultivator is interested in them only as varieties, and it is of no particular moment to him whether we have one hundred, or only one native species." Too many cultivators have too long acted upon this idea, or rather this want of ideas, concerning the grape. I do not know "all about grapes," but for the last twenty years I have devoted much care to grape-culture in Western Texas, and the results reached have come from dearly bought experi-

ence, and careful observation from a climatic standpoint not yet occupied by our older and more northern horticulturists. I can hardly give my general conclusions in less space than to condense them from a letter written to Prof. Husmann last year.

My own theory, as applied to the United States, has been, and yet is, something like this: That besides the *rotundifolia*, the Southern *æstivalis* family (of which the Herbemont, Louisiana, and Lenoir are types), must furnish the grapes for the extreme South, either by itself, or by hybridization on southern natives. That the northern limit of the Southern *æstivalis* is governed by the isothermal line, beyond which it fails, for a sufficient time, to receive the needed heat in summer, or is killed by the cold of winter. That the Northern *æstivalis* (of which the Cynthiana and Norton are a type) will flourish still further north, but will give poor results in the extreme South. That the regions or zones of the *æstivalis* family overlap each other in the northern portions of Texas and other localities.

That the *Labrusca* family belongs still north of the *æstivalis*, but will thrive in the northern portion of the Northern *æstivalis* belt, while below that region it will appear successful for a time, but decline after two or three good crops.

That the *cordifolia* will succeed in both the *Labrusca* and Northern *æstivalis* belt, but will fail in the southern portion of the Southern *æstivalis* belt.

That the *vinifera* varieties, although adapted to our climate, must fail everywhere sooner or later, on account of Phylloxera, except in localities where they are protected by special causes.

That the above families of grapes will give first-class results only in their climatic bounds, not because of any one peculiar feature of the growth, but because of their constitution throughout the various parts of their being.

And finally, that these families of grapes must, with allowances to be made for different degrees of humidity, become the grapes for their respective zones throughout the whole world. In stating this general proposition, it is not disputed but that families with which the horticulturists are yet unacquainted, may supply varieties in the future, and that the viticulture of every zone may be enriched by new hybrid combinations of material belonging to the same belt. But I do protest against the system of wholesale waste of labor and dissipation of capital, which, I believe, must ever result from the indiscriminate planting of every and any variety, whether it belongs to our region or not.

I began grape-culture by following old masters of the far Northeast. I learned to see that while their teaching may do for New York and New England, it does not apply to our region. They want *Labruscas, cordifolias,* and their hybrids. We do not, because they are not adapted here. It is in vain that we may determine that because our fancy leads us to prefer this or that variety, that we will, therefore, insist upon its cultivation whether it is constitutionally adapted or not. While peculiar surroundings, natural or artificial, may favor different varieties of different families, yet common sense tells us that these exceptions do not disprove a rule, and experience teaches the necessity of following the demands of Nature. And what are the demands of Nature in determining the varieties of grapes for Texas?

While in Northern Texas it is quite likely that the whole of the *Labrusca* family will continue to give only temporary success, yet the Northern *æstivalis,* which may be represented by the Cynthiana and Norton, may prove successful as well as the Southern *æstivalis,* represented by the Herbemont, Louisiana, Lenoir, etc. If I understand Prof. Krausse, of Waco, that the Cynthiana succeeds well with him, I should then presume in favor of

the whole Northern *æstivalis* family, until experience should prove the contrary.

My own personal experience is confined to Southern Texas. Here the Southern *æstivalis* varieties have furnished our success, except in localities where prevailing obstacles are overcome by some special cause. Our very best grapes for the table or wine is the Herbemont, also known as the Warren. The Lenoir, known better at Houston as the Burgundy, and at San Antonio as the Black Spanish, is also hardy and productive, although not so good for the table as the Warren. Both are excellent for wine, and both took prizes at Montpelier, France, where over six hundred varieties of wine were exhibited.

The Warren will produce in the fourth year from planting, 500 gallons of pure juice to the acre on common, unmanured upland, that will not make more than 20 bushels of corn to the acre. The whole family prefer dry soils, and do not object to a large proportion of lime in the soil. The Lenoir comes into bearing a trifle later than the Warren, but I believe the yield is finally satisfactory. About San Antonio and New Braunfels the Lenoir is the prevailing grape. In this (Victoria) and adjoining counties, the Warren has driven the Lenoir quite out of cultivation. The Louisiana also promises well. The Cunningham grows well, but wants a dryer air than we often have in Victoria County.

We have a new Southern *æstivalis* grape, that seems to combine the qualities of the Warren, with the size of the Eumelan. It originated in the garden of Col. Harwood, at Gonzales, and by him is called the "Improved Warren." It has, as yet, been tested in only a few instances, and if it succeeds as it has begun, then it is the rare treasure we have been looking for for the last twenty-five years. Capt. Jones (the pioneer fruit-grower at Gonzales) and myself agreed to call this new grape the

Harwood, in honor of its originator, and it is disseminated both from his nursery and my own as the *Harwood.* We hope that the name will be accepted.

While the "lists" of many nurseries teem with a host of varieties, each one of which is recommended to be just what every customer wants, yet the truth seems to be that there is no one region to which many varieties are perfectly adapted. The cultivators of each region find themselves finally driven to a very small number of varieties for profit. If the Cynthiana was blotted out in Missouri, or the Isabella and Delaware in New York, and so on, one or two varieties were blotted out from each general locality, it would prove a staggering blow to grape-culture. And if we in Texas have only a few varieties suited to our region, we yet have as many successful ones as many older communities that boast of success. It is within the memory of living men, that the famous grape regions of the North were, in grape culture, far behind what Texas is to-day. Already our southern Herbemont can scarcely be surpassed in value by any northern variety.

The time and skill which have been expended by Northern horticulturists upon northern families of grapes have vastly improved their vineyards. But we of the extreme South have a similar work to perform, and may well expect that when a corresponding amount of effort has been made to improve the hitherto neglected Southern *æstivalis* family of grapes, then may we expect to excel our Northern cousins in the production of the vine, as far as we excel them in the natural advantages of our incomparable climate and the abundance and richness of our natural resources. Perhaps I am an enthusiast, but with the light of twenty-seven years of horticultural study and experience in Western Texas, with a fair knowledge of the North and the great Northwest, and in view of our recent progress and

UNIVERSITY CALIFORNIA

present position in horticulture, and considering also our improving communications with the outside world, it seems to me that the day is near when Texas shall be regarded truly by the nation and the world, as indeed the Italy of America—the Empire State of the Union—the great garden of the Continent.

CHAPTER XXXV.

GRAPE GROWING IN WESTERN TEXAS.

BY RUDOLPH EIKEL, NEW BRAUNFELS.

My first experiments in grape culture in this country were made more than thirty years ago, with European varieties (*Vitis vinifera*). The vines grew very well for several years, but seldom produced fruit. One of my neighbors once grew a very fair crop of Riessling, and the wine made from them was delicious. But all these experiments failed eventually, the vines lived and grew for several years, but died out finally.

I then planted several acres with Black Spanish, which had been successfully tested here, and could be grown with good results. I also received about thirty varieties of American grapes from St. Louis; among them I found three which flourish well here, and which can be grown with certainty, viz.: the Herbemont, Rulander, and Louisiana. The Herbemont is equal to the Black Spanish in growth and productiveness.

The Black Spanish is equally successful in black "gumbo" soil or sand, on the hills as well as in valleys, but the hill-sides are preferable, as it can not stand wet weather, and the fruit rots when exposed to it. The bunches are long and compact, berry small, with thin skin, black,

with brisk sub-acid juice, which makes a fine wine of dark-red, almost black color. The wine is also known here as El Paso, and it is generally believed that it was introduced from Mexico, which I do not believe, however, as I cannot find that it is grown at El Paso, or in Mexico. It was first planted here by a Mr. Merriweather, about 25 years ago, who undoubtedly brought it from his native State, Mississippi.

Among the wild varieties here is the *Vitis rupestris.* It grows in stony limestone soil, also in the gravelly soils of our steep hillsides. It grows vigorously, but does not make long canes. The fruit is medium, very sweet, and ripens in August. I have great hopes of this grape, and believe that it has a future. I planted it about 3 years ago, especially as a stock for other varieties, and have had great success so far. I have grafted several of the best *viniferas* on it, among others, three varieties of Malaga, Riessling, Blue and White Tokay, Chasselas de Fontainebleau, and Gutedel, and they have all grown satisfactorily. Some of them have had some very choice fruit this season, although very young yet. It is, however, a new experiment, and time alone can show whether it will be ultimately successful.

We have also three varieties of Mustang grape, blue, white, and red; the two last are seldom met with; the blue is very abundant, especially on the banks of our rivers; it bears abundantly, the berries are large, rather acid, and make a tolerably fair red wine, which is produced in considerable quantity. It ripens in July.

The so-called Winter Grape (*Vitis cordifolia*) grows in great abundance here, on stony hillsides, and also in our river bottoms, bears pretty well; berry small, nearly black, with thin skin. It ripens in September, and makes a very good, fiery wine of dark-red color, much better than that from the Mustang. There is a good deal

of wine made from this also, and the wine from the hillsides is much better than that from the bottoms.

Grape growing is still in its infancy here, but has a future in this State; soil and climate are favorable to grape-culture, and will surely be taken advantage of in time. The cultivation of the Black Spanish has been followed so successfully, that it attracts more and more attention every year. It will take several years yet, before other varieties are found which can be grown equally well; but this is only a question of time, and, as remarked before, we have several varieties already, which could be cultivated with profit, but I believe the Black Spanish will remain our leading variety.

[NOTE.]—I have cultivated the Black Spanish here in Missouri, and made an excellent wine from it several times. It is the same grape that has been distributed by the Department of Agriculture as Devereux, and it makes a splendid red wine indeed, but is too far north, and too much subject to mildew here to be successful. It seems to me that where this and the Herbemont succeed so well as they seem to do in Texas, it will be difficult to find grapes that will surpass them in the quantity and excellence of their wines. G. H.

CHAPTER XXXVI.

THE CULTURE OF THE GRAPE IN CALIFORNIA.

BY GUSTAF EISEN.

EISEN VINEYARD,
FRESNO, FRESNO CO., CALIFORNIA,
December 1st, 1879.

George Husmann, Esq.:

DEAR SIR.—Your kind letter just received. If you had written to me earlier I would have taken pleasure in furnishing you with some notes regarding grape culture and wine making in Fresno. At this late hour I must restrict myself to the most preliminary statement, hoping it will not come too late if you should deem it of sufficient interest to be used in your forthcoming work on Grape Culture.

California takes, already, a prominent place among grape-growing countries, and furnishes within its limited area so many different climates and localities, that nearly every kind or variety of grapes will flourish here. For example, in the hills of Sonoma we meet with the most perfect Riessling, producing wines of a light, delicate cast, and 200 miles further south in Fresno Co., the summer is both warm and long enough to produce such wines as Port and Sherry, which, according to such experts as Rev. I. Bleasdale, in Melbourne, equal some of the very finest Portuguese wines. Only six or seven years ago, Fresno Co. was generally considered as a most barren waste, a desert in fact, where the dry, and during the summer, cracked soil, was thought to indicate the utmost poverty. Our plain extends 100 miles, at least, in every direction ; on the north side it is bordered by the large San Joaquin River, and on the east and on the south by an equally large stream, King's River. The fact that

water for irrigation was to be found so near at hand, caused several to suspect that the land was not altogether so worthless as generally believed. The Southern Pacific Railroad was drawn through the county, the water was taken out from the rivers and made to flow through the plains, and to-day, only six years after settlement, we pride ourselves on having the finest vineyards in the State, and the brightest prospects for the future.

Grapes, as well as everything else, have to be grown with irrigation. The land must be leveled, and so prepared that it can be flooded whenever needed. The soil is very variable, but consists principally of three varieties. First, a red clay soil; this is the best for grapes. Second, a white, ashy-alluvial soil, evidently made up mostly of pumice stone, the original beds of which can yet be seen at the foot-hills; this soil is much poorer both for grapes and other plants. Third, a sandy, yellow soil, poor in organic matters, and always occurring on elevated places; this soil is worthless for grapes.

My brother's vineyard consists, principally, of the first named soil. The first year the land had to be flooded six or seven times during the summer, to make the cuttings grow, but now the whole country seems to be filled up with water, and one irrigation during the winter is enough. Cuttings planted directly in the vineyard last year, needed only two irrigations during the summer, and will after this need only one every winter. The first year we found water at a depth of 65 feet. Last summer we found it at a distance of 6 feet below the surface. We have found that the best way of starting a vineyard is to plant cuttings directly in the ground where they are to remain. Generally we plant the cuttings, say 2 feet deep, but for a trial, I planted some 5 feet deep, and the latter at one year old were several times larger than the former, and bore quite a crop the first summer. Our soil is deep and loose, and free from stones. This enables us

to plant all the grapes with a crowbar, taking care to fill the holes well. Of course we plant all the cuttings straight up and down. Two men can, in this way, comfortably plant 1,200 cuttings a day, and sometimes more. We plant the cuttings 8 by 8 feet apart, leaving a road at every twenty rows of vines.

I have found that the best way is, to have the grapes planted in checks or squares, of say 3½ acres, having a good solid bank of earth all round the same. Near to, and on these banks, no grapes should be planted, because they must be free to receive the prunings every winter, and which prunings must be burned on these banks every spring, so as to kill all the weeds and insects injurious to the grapes. In this way a good deal of hoeing is saved. I plow 4 inches deep and cultivate crossways, and keep cultivating the whole summer. Some parts of the vineyard I cultivated as much as seventeen times last summer.

In December, or as soon as the vintage is over, I begin to prune the vines. I cut off all the superfluous wood, taking care not to touch those canes which are to bear the next year's crop. Those I leave altogether until the middle of April, when I trim them back to two or three eyes as required. The reason for this is, that we nearly always have heavy frosts between the 6th and 12th of April, and if then the fruit buds have started they are sure to be lost. By leaving long canes, however, I manage to keep them dormant until after the frosty season. Between February and April we have no frost. The trunk on our vines is generally kept to 2 feet, and many of the superior grapes rest on the ground and mature there. We use neither stakes nor trellis.

The grapes ripen generally in the middle of August, and the vintage can then begin. Some varieties, however, have been known to be ripe in favorable years as early as the 4th of July. The percentage of sugar is generally very large, average 14° to 16°, but sometimes as

high as 16° on Beaumé's saccharometer, when at the same time pure water shows 2° on the same scale.

The Eisen Vineyard comprises at present 160 acres, and every year about 20 acres are added, the bulk of the grapes being Zinfindel, Malvoisie, and Fahirzozos, the former two producing Claret and Port, the latter White Wine. The Zinfindel is here considered the best grape; its color is excellent, and its flavor and acid splendid. The vines average 25 lbs. each of grapes, but as much as 50 lbs. have often been raised on certain varieties, such as Chasselas, Rose of Peru, and others. A peculiar trait of some grapes is that they do not color. The Rose of Peru, elsewhere considered one of the finest black grapes, loses its color here entirely, while the Zinfindel always retains its dark color. In Stockton, 150 miles from here, the contrary takes place. There the Rose of Peru is always of a dark, black color, while the Zinfindel turns nearly white.

Besides the above varieties, we have on the place, in different quantities, nearly 100 varieties, mostly foreign, but it is also our intention to experiment with American varieties, especially those of the *æstivalis* and *cordifolia* classes. Of the former we have a few hundred of Norton's Virginia; they have grown enormously, but will not fruit before next year.

The must we ferment in tanks containing 2,000 or 2,500 gallons, and the wine is kept in casks of the same size. The brandy distilled from mash and wine is of a very high quality, according to Rev. Dr. Bleasdale and other experts, is entirely free from fusel oil, and of a very fine natural bouquet.

CHAPTER XXXVII.

VITICULTURE IN SONOMA VALLEY, CALIFORNIA.

BY JULIUS DRESEL.

When the first American emigrants came to California, they found vines already planted in many places, especially around the religious colonies, or missions, established by the Jesuit Fathers. From this fact was derived the name, Mission grape, for that vigorous, but rather coarse, originally Spanish, red grape, which soon spread over the whole State, and has ever since provided the market with the California Hock, Claret, Port, and Angelica wines. Soon, however, the best European varieties from Hungary, Germany, and France, were introduced, they grew equally well nearly everywhere, and were designated as "Foreigns." Some of these foreign varieties are mainly raised for table use, as Flaming Tokay, Black Hamburg, Muscat of Alexandria, and many others, or to be turned into raisins; but our best white wines are now principally made from the Riessling, Gutedel (Chasselas), Muscatel, Burger, and the red, by preference, from the Zinfindel.

As labor was too high to allow of the use of the hoe, our vineyards had to be cultivated by the plow, and consequently the vines were planted 8 feet, sometimes 6 feet, and lately 7 feet apart each way, allowing the single plow as well as a two-horse team to pass both ways. The ground is laid out with the chain, every 7 feet being marked by a small, white stick, and the cuttings, or better rootlings, are planted; these are 20 inches long and placed slantingly, in holes dug by the spade, about 2 feet deep. The stick is, two years later, replaced by a strong stake 3½ to 4 feet long, to which to tie the vine until the stem, commonly 18 inches to 2 feet high, is big

enough (after about six years) to support its fruit and umbrella-like foliage, by itself.

Pruning is done during winter, but in the lower places as late as possible, to retard the starting of the vines, as there is danger of the morning frosts, which sometimes set in even as late as the 15th of May. We allow the grown vines from five to nine spurs of two eyes each, according to age and size, excepting the Riessling, which has been found to bear more if left with long spurs of four eyes and some short spurs besides. During spring the plowing, harrowing, and weeding with the cultivator, are done. After the beginning of May no more work is needed, as the constant sunshine will not permit any weeds to grow; only about blossoming time, during the first weeks of June, Flowers of Sulphur is applied with bellows, as a preventive of or cure for mildew, which prevails in certain localities. Towards the end of September the grapes are ready for picking, and the harvest continues through October, and may be finished as well in November, the sun shining all the while. Occasionally indeed, some rain falls in October, but very seldom any damage is done.

Entire failures in the crop, as well as great difference in the quality of the fruit, are unknown here; but though there have been 50 pounds of grapes seen on one vine, and whole vineyards of the Mission grape averaging 36 pounds, it would not be a safe calculation to put the average yield of one vine at more than about half a gallon. The devastations of the Phylloxera, which will hereafter have to be taken into account, can be effectively met by grafting on Phylloxera proof American stock of Frost grape, or *riparia* species; for instance, on Taylor and Elvira. The experiments in this direction, that have been tried in France, have also been successful here so far.

Regarding the quality of the wines of California, they have been rated as too rich in alcohol, and rather deficient

in acid. They carry indeed, from 10 to 13 per cent of alcohol, but then there are, happily, those years when the grape, in its super-abundance of juice, develops less saccharine matter; and besides we have, luckily, varieties which, even up to maturity, retain an agreeable acidity, and are invaluable not only in themselves, as Zinfindel, but also for cutting purposes, as Burger, to impart more acidity to the Mission, or its superiors, the Gutedel, Muscatel, Riessling, and others.

It is now over twenty years that the bulk of our vineyards have been laid out, and ever since we had to contend with fearful odds to fairly establish this interesting branch of industry. A high rate of interest, high wages for white labor—the Chinaman is one dollar a day—the unpopularity of the article and its ruinously low prices, all combined to make our progress a really thorny one. Notwithstanding this we may look back with satisfaction upon our struggle, for did we not come out victoriously at last? The market for our wines is finally made, they have spread, they are appreciated, and in good demand all over the Union; and considering their intrinsic value, and their scarcity, in comparison with the population of this country, I think we are justified in expecting now better times for our viticulture. Thereupon we act, the old pioneer is undismayed, new vineyards continue to be planted, and even before they have grown up, Americans will have improved so much in the knowledge of wines, that the quantity of all the precious wines California can raise will be utterly insufficient for the future consumption of our nation. Yes, this peculiar, temperance-fostering industry will yet grow to be a blessing for the people and—a splendid business after all.

CHAPTER XXXVIII.

VITICULTURE IN NAPA COUNTY, CALIFORNIA.

BY H. W. CRABB, OF OAKVILLE.

The cultivation of the vine in this State was commenced by the Mission Fathers three-quarters of a century ago, with a single variety. The history of its origin is not known, further than that it is identical with the Pisca vine I imported from Chili—one of the oldest varieties in cultivation there, and is the brandy grape of that country, as the Mission grape has become of this. It is a vigorous grower and a good bearer, containing a high per cent of sugar, and a small degree of acid, and is well adapted for Sherry, Madeira, and Angelica wines, and for Brandy.

The Riessling, White Pineau, and Chasselas stand at the head of the list for dry, white wines, on account of their lightness, fineness, and delicacy of flavor. Black Burgundy, Zinfindel, and Charboneau are our best varieties for Claret. The first makes a dark, full-bodied, and richly-flavored wine. The second has a fine raspberry flavor, but rather an excess of acid, and is a little light, both in body and color. The last one, like the Tinto, has but one characteristic color. Black Malvoisie is our best Port wine grape. The large White Muscatel makes the finest raisins, and the White Malaga the next best; while the raisins of the Seedless Sultana are the *ne plus ultra* for culinary purposes.

In planting and grafting, only the cuttings of bearing canes are used, and are worth from $2 to $5 per thousand. In planting I plow the ground twice, sub-soiling it the last time, then harrow well and roll it. Make a chain of

No. 12 or 14 steel wire 165 feet long, and put on it a drop of solder every 6½ feet, beginning fifteen inches from one end, which serves to make a loop for an iron pin 18 inches long, to stick in the ground to hold the chain. Square the ground, chain along one side, setting a small peg or stake at each drop on the chain, then stretch the chain at right angles across the end, and chain back from the other end of the chain, setting a peg at each drop as before, which marks out one block. Now stretch the chain across the block, and plant 24 rows, leaving the rows of pegs for avenues. Make a dibble out of a piece of 1¼ inch gas pipe, by welding and sharpening one end and putting a pin near the other for the hands and one for the foot. Make a hole with this and insert the cutting and tighten it by shoving the dibble down by one side and pressing the ground against it. I use cuttings 16 inches long, leaving two buds above the surface. If rooted vines are used, cut the roots back close to the stock. We set about 500 per day to the man, and 1,000 to the acre. From four to eight men work on a chain, and we can work from two to four chains or gangs on a block. This plan is very simple, speedy, and accurate, and any kind of help can do the work correctly; it is equally well adapted to planting small fruits and trees after the holes are dug. We usually plant the last of March and first of April; the loss is from 5 to 10 per cent.

Among the various methods of grafting, I have had the best success by sawing off the vine from 4 to 6 inches below the surface of the ground, making a clean cut with a razor a little diagonally, and inserting one or two scions, covering the cleft or cut with a piece of cloth, and filling up with fine earth. The graft must be staked and kept well tied up the first season, and a fair crop of grapes may be expected the next. Grafting should be done here in February and March. Two men can graft about 100 vines per day.

I prune with low heads and short spurs of two fruit buds each. Any variety that will not yield from four to six tons per acre is pruned in this manner: I leave from two to four canes of 2-feet each, and about as many short spurs of two buds each, for long canes the next year, when the long ones are to be entirely removed. The Riessling, Muscatel, and some others, will yield twice as much by this method of pruning, as the other. Occasionally there are instances reported of a single variety, or a small vineyard, yielding 10, 12, 14, and even 20 tons on irrigated land, but such crops are a positive injury to both fruit and vine. My vineyard of 120 acres yielded in 1878, 5½ tons per acre, on 30 acres of which the vines were only three years old, but this season, on account of cold rains, alternated by extreme heat, while the vines were in bloom, the same vineyard only had an average of 4 tons. The crop throughout the State is about one-fourth short.

In 1876 the business dragged heavily, nearly bankrupting numbers. Wines were in large stock and had to be sold to distillers and vinegar factories, at 10 to 15 cents per gallon. Savings banks refused to make loans on vineyard property, considering that vines added no value to the land whatever. Even many small vineyards were dug out. Mission grapes sold from $8 to $10 per ton. I could only get an offer of $13 per ton for a lot of 300 tons of grapes of choice foreign varieties, delivered at the cellar and payable in three, six, and nine months. There was no market for our wines. They were in bad repute, due mainly to adulterating processes which were carried on to a very great extent in the interest of importers, and for the purpose of crushing the wine and brandy manufacture here. But since that time the business has steadily increased. The report of the Surveyor General of the State for the year 1876 gave 35,000 acres of vineyards; the next year 41,000; the next 77,000; and this

year may be estimated at from 85,000 to 90,000 acres, making an average increase of about 35 per cent for the last four years. In 1876 we exported by sea and rail 1,115,000 gallons wine, and 59,000 gallons brandy. In 1878 the exports were, of wine, 1,812,000 gallons, and of brandy, 129,000 gallons; and this year the estimates are 2,224,000 gallons of wine, and 160,000 gallons of brandy. The French wine imports have decreased from 7,000,000 gallons in 1872, to 2,486,000 in 1877. About an average of 30 per cent per year. This increase and reversion of trade may be attributed to our protective tariff, the ravages of the Phylloxera in Europe, and to the genuineness and acknowledged merit of our wines. I commenced making wine about the 20th of September, and did the crushing, stemming, and pumping by steam power. The crusher is an improvement on a French pattern, and is capable of crushing and stemming over 100 tons per day, doing the work in the most perfect manner. My product for the season is about 225,000 gallons, and that of the County, about 1,700,000 gallons. The last report of the Surveyor General gives the product of the State as 7,790,000 gallons, or about 50 per cent of the entire production of the United States.

The crop of raisins cured annually is valued at from $60,000 to $80,000. This year's yield is probably 600 tons, or 60,000 boxes of 20 pounds each, worth at wholesale from $1.50 to $2 per box. This branch of the grape interest is increasing rapidly. The present active demand and advance in price, with a partial failure of the crop in Spain, will give a lively stimulus to the business.

There are now about $30,000,000 of capital invested here in the grape and wine interest, and it gives employment to more than 12,000 persons.

Many new vineyards, and large additions to old ones, will be planted this year. In fact, I believe there will be as many planted this season as there were in the last

three years. Grapes have steadily advanced in price since 1876, at the rate of $2 per ton each year, bringing the last season from $15 to $25 per ton, and large cellars of wine have been sold at 25 cents per gallon.

The Phylloxera, as yet, is not found outside of Sonoma Co., where a few vineyards have been more or less injured. It does not make the rapid progress ascribed to it in Europe and, I believe, has not yet appeared here in the winged form. I believe it is attributable to old age, bed-rock, or hard-pan near the surface, and exhausted soil, whereby the vine becomes impoverished, and in that condition it is just as natural for it to be attacked by some parasite or insect as an impoverished animal is to become covered with vermin.

It is estimated that there are 40,000,000 acres of land in this State well adapted to viticulture, and the time is not far distant when the vineyard product will exceed all the other resources of the State combined.

If the industry be not stifled by Congressional legislation, whoever lives a half a century hence, will find the grapes of California in every city of the Union; her raisins supplying the whole Western Hemisphere; her wines in every mart of the globe, and then, with her golden shores, her sunny clime, her vine-clad hills and plains, will California, indeed, be the Vineland of the world.

CHAPTER XXXIX.

GRAPE CULTURE IN MARYLAND.—CASHIN'S TRELLISES.

BY T. D. CASHIN, HAGERSTOWN, MD.

The following is by T. D. Cashin, an experienced fruit grower and nurseryman, who, in a letter dated February 5th, 1880, writes:

"My grand object is to get a superior grape for market alone that will be free from rot. One of our would-be scientific men here says, that all seedlings of Taylor will inherit its defect of failing to fertilize its fruit, but of course you are more capable of judging in that matter than a mere theorist. In fact, the grape-growers of Missouri are doing more for the future and permanence of American grape-culture, than all others in the United States combined. Our Eastern people are all following the old beaten track—*Labrusca* and its hybrids, leading to the same final result—failure; at least that is my opinion after 14 years of study and experience. I mean to try the Amber in the spring. I have an excellent *riparia* (*cordifolia*) seedling of my own; in quality it is better than Elvira, but not so large."

In a letter dated February 16th, he writes as follows:

"DEAR SIR—Your letter and the picture of the Amber grape reached me a few days ago. Thanks for the information given in regard to varieties that I am interested in. For the past three years I have been searching for such a grape as the Amber; the bunch is elegant, and must be, I am sure, much finer in Nature's colors than as represented in the plate.

"I certainly agree with you that the grape-growers in Missouri who are endeavoring to improve the *riparia*

(*cordifolia*) species, are working on the right basis, and hope that they will be amply rewarded for the time, patience, and study required in the undertaking.

"Of late years I have been experimenting and observing as to the proper methods of training vines of this class, taking Clinton as the subject to work upon, and find that the form of an arbor or canopy is the most successful, as it approaches more nearly to the growth of the vine in its natural state. I have two methods, one for vines planted 10 feet or more apart, the other for those at a lesser distance. The first may be called the "Horizontal Spiral" method, the other "Horizontal Zig-Zag," long-arm and spur-pruning is followed in both; they include the principle of retarding the flow of sap towards the top of the vine, thereby, to a great extent, equalizing the distribution of fruit and wood-forming material. The trellises are durable and inexpensive, and do away with nearly all the labor of tying. I am very glad indeed if you have found anything in my former brief letter that may be of interest to others, and if you think that drawings of the above named methods of training might possibly be useful additions to your book, I shall be happy to furnish them.

"I have, so far, succeeded in raising only two vines from the original *riparia* seedling, but shall take pleasure in sending you one of them early in the spring for trial. I have named it the "Golden Delaware," and am certain that it will compare favorably with its namesake. The leaf is strong and folds in a peculiar manner, and the fruit is exceedingly delicate and refined—assuming a beautiful, golden color when ripe."

In compliance with a request for a description of the methods of training referred to in the foregoing letter, Mr. Cashin furnishes the following, accompanied by sketches from which the engravings are made:

CASHIN'S TRELLISES.

The methods of training shown in the illustrations (figs. 26 and 27) have many advantages over those commonly used by grape-growers, and are well adapted to our strong growing native vines, especially those of the *cordifolia* or *riparia* species. Some of the advantages may be named as follows: Cheapness, simplicity, and a great saving in the labor of tying, which is almost done away with except after intervals of years when the arms are renewed, then ties are necessary to hold the arms in place for the first season, after which they retain the form given them. Tying is an important item, as many grape-growers know to their cost.

The horizontal position of the vine and drooping form which the fruiting canes assume, are in accord with the natural habit of the grape-vine. This and the check given to the flow of sap towards the top of the vine by winding the arms around poles, as in figure 26, or bending them in a serpentine form, as in figure 27, has the effect of more evenly distributing wood-producing and fruit-forming material, thereby keeping up a proper balance between the top and base of the vine.

In both methods the fruit hangs under the foliage and is shaded from the glare and heat of the sun. Grapes protected in this manner have a much finer bloom than when exposed. The canes are pruned to spurs of two or three buds. Summer-pruning is not resorted to except to repress the overgrowth of canes to the end that there may be a free circulation of air under the vines; though there can be no doubt that a judicious summer-pruning would be beneficial.

What I have called the "Horizontal Spiral" method, is shown in figure 26. The trellis is formed of locust stakes 5½ feet long, 3½ inches thick, and are set to a depth of 18 inches, leaving them 4 feet high. Round

REES... OF THE UNIVERSITY OF CALIFORNIA

chestnut poles of nearly the same thickness as the stakes are nailed to the top of them, the ends of the poles being made to lap, one upon the other. This method can be used to advantage in vineyards where the vines are

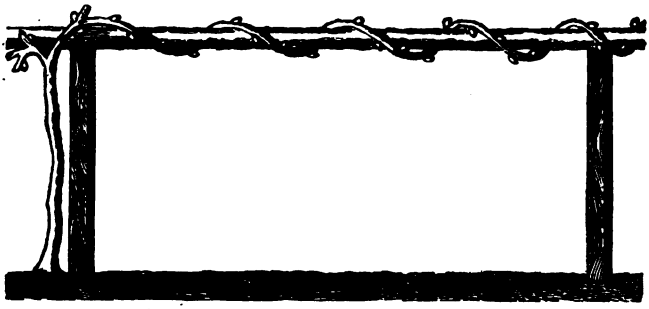


Fig. 26.—HORIZONTAL SPIRAL METHOD.

planted closely, say from 5 to 8 feet apart in the rows; 8 feet would be the better distance, the rows being 7 feet apart. The winding of the arm allows an increase in its length of about one-third.

The "Horizontal Zig-Zag" method is shown in figure

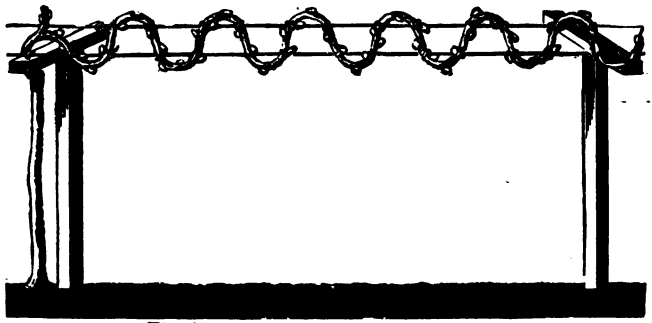


Fig. 27.—HORIZONTAL ZIG-ZAG METHOD.

27; this is intended for strong-growing varieties. The vines may be planted from 9 to 12 feet apart in the rows, which may be 9 feet apart. In this method the bending of the arms allow an increase in their length of about

two-thirds of the space alloted to them; for instance, if the distance between the vines in the row were 9 feet, the arms would be 15 feet in length. The stakes are the same as in figure 26, but instead of poles, pieces of 2 by 4-inch scantling 16 inches long are nailed crosswise on the top of each stake. Two wires (No. 10) rest on the cross-pieces 14 inches apart, resembling the arrangement of telegraph wires, and are fastened with small staples. At the end of the rows the wires are attached to iron pins sunk in larger cross-pieces, which are spiked to posts; the heads of these pins are square, so that the wires can be tightened or loosened as required, with a wrench.

In starting a vineyard I allow the vines to grow at will during the first season, keeping the ground loose and free from weeds; in the fall or early winter the vines are cut back, leaving but two canes shortened to two buds each. If there is but one really strong cane, it is pruned to three buds, and the other shoots on the vine cut away altogether. In the spring of the second year the stakes are put in, and only three canes to each vine allowed to grow. When the two stronger ones have attained a length of 2 feet, the weaker cane is removed, and the others carefully tied to the stake with cotton cloth. The ends of these are pinched when they have reached the hight of the stake (4 feet), and then whatever laterals that may appear are allowed to grow unchecked. The fall-pruning consists of merely cutting off the laterals. Then, or early in the following spring, the trellis is completed.

During the third season a few bunches of fruit are suffered to remain on each vine, from three to six, according to the strength of growth, but none whatever on weak vines, and all shoots bearing fruit are pinched to three joints beyond the bunches. The other shoots are removed, excepting the topmost one, on each cane; these are left to grow unchecked, and, in order that they may make a strong growth, not allowed to bear fruit this season.

These are the arms, and as they extend are trained horizontally—to the right and left of the vine along the poles or wires as the case may be, and tied with some soft material.

In the fall, or before March 1st of the fourth year, the shoots on the lower part of the vine are all cut off; the arms are trimmed of weak or unripe wood, and then, as in figure 26, they are wound around the poles, one to the right, the other to the left of the vine, and the tips fastened to the pole with double-pointed carpet tacks. Arms from the next vines in the row are wound on the same poles, between and following the same curves as the first, and fastened in like manner, so that there will be two arms in each space between the vines. Should an arm fail to gain the length required to fill the space allotted to it, it can be lengthened the same season by terminal shoots.

In figure 27 the arms are bent to and fro in a zig-zag manner, and rest on top of the wires; the bends or elbows are extended about $2^1/_2$ inches beyond the wires on either side; the bends are formed in succession, and tied to the wire at each point where they rest upon it, making two ties at each bend.

The arms are thus kept in place for the first season of their training, after which they retain the form given them, and are held in position by the shoots of new wood growing under and over the wires.

Two arms are used in the same space if desired, but they should be bent to cross each other in opposite directions, instead of following the same curve. In either method the arms should be renewed after intervals of five or six years. This is done by cutting back one arm on each vine to its lowest shoot, and when a new arm has grown from this, the other arm is cut back and renewed in like manner.

CHAPTER XL.

GRAPE CULTURE IN MISSOURI.

BY THE HON. FR. MUENCH.

(Extract from a Letter written for the Am. Wine and Grape Grower.)

"1. I must wonder, that still the Herbemont, Lenoir, Devereux, Elsinburg, Eumelan, Norton, Cynthiana, Cunningham, Hermann, Louisiana, Humboldt, Neosho, etc., are thrown together as belonging to the *æstivalis* class. In truth, there is as much essential difference between some of those vines as between the Clinton and Concords. A certain class of vines to which the Herbemont, Lenoir, Cunningham, Devereux, Rulander, Louisiana, and their seedlings, and probably the Delaware belong, and which are by some named southern *æstivalis*, are in my 'School for American Grape Culture' designated as '*vinifera*-like' for the following reasons: Some of them (as the Louisiana and Rulander) are ostensibly or undoubtedly of European origin—others may be descended from the seeds of imported vines (as the Delaware) found growing wild in the woods near the place where once Joseph Bonaparte lived, and most similar to the well-known Traminer which he had tried to cultivate on his villa; others may first have been planted by the Huguenots in South Carolina and elsewhere, and disseminated by birds; at any rate, these vines, materially differing from all our indigenous varieties, are so nearly related to the *Vitis vinifera*, that, for instance, visiting the vineyards near Zurich, in Switzerland (in 1859), I could hardly distinguish the vines growing there from our own Herbemont. Thus we have here a quite peculiar class of vines not to be amalgamated with the true *æstivalis* or any other grape family.

"2. Most surely are the *æstivalis* vines—in combination with a number of Taylor seedlings—best suited for the vast region extending between the 40th and 36th degree of latitude, from the Atlantic to the Pacific Ocean; north of this region is the true home of the *Labrusca* vines and the earlier Taylor seedlings (Noah, Black Pearl, etc.), while south of it the Scuppernong and some *vinifera*-like, and also *æstivalis* vines thrive best. Chiefly the middle portion of the Mississippi Valley (Missouri, Arkansas, etc.) is apt to produce from our best *æstivalis* vines dark wines of the highest excellence.

"3. All the *æstivalis* vines tried by me are not only 'Phylloxera-proof,' but also rot-proof, except in the most unfavorable seasons in unsuitable positions, and by careless and unreasonable treatment.

"4. As a general thing the berries of the *æstivalis* grapes are destitute of pulp, but there are several inferior as well as most highly valuable. Some *æstivalis* vines are very pulpy, for instance, the Far West (first grown by me from a scion plucked in the original forests of Newton Co., in S. W. Missouri), which yields a red wine, declared by connoisseurs to be of the finest flavor and aroma, quite new, and as yet unsurpassed.

"5. It is lost labor to try to propagate some of the *æstivalis* vines from cuttings, or even in propagating houses, such as Neosho, Far West, and the Arkansas varieties, the wood of which is as hard as white-thorn (which fits them to withstand our variable climate and the whims of our weather); they must be propagated either by grafting (they will not grow well on *Labrusca* roots) or by very careful layering.

"6. The Elsinburg I would rather class among the *cordifolias*, it being apparently near akin to the Clinton.

"7. The Ives, Perkins, and the like, I do not consider

worth cultivating, while with us the noble Cynthiana and Neosho do remarkably well, to which other highly valuable Western varieties will soon be added."

CHAPTER XLI.

GRAPE CULTURE NEAR CHATTANOOGA, TENN.

(*From the Chattanooga Times.*)

It will be, perhaps, a little surprising to some when the real status and future of grape-growing in this section is known. We have taken some pains to investigate this matter, and although our figures may not be precisely right, they are still approximately correct.

There are now 150 acres of land around Chattanooga within a radius of five miles, entirely devoted to grape-culture. All of this is now in bearing, but the next season the prospect is that much more of this land will be put into grape cultivation. Seventy acres are owned by Stanley & Rickey, the rest is owned by parties in small lots. This year the grapes, as a general rule, are much finer than usual, but there will be only about half a crop, caused by the unusual cold spring. In the last six years there has been no failure at all in the crop, and all but one were fair. The crop this season will amount to about 200,000 pounds. An acre, when trellised well, will, on an average, yield about 4,000 pounds, and where there are only poles, about 2,000 pounds. The average price in the Northern market the year around is about ten cents; therefore, this year's grape crop will bring about $20,000 in this section. At present the high express rates and frequent trans-

fers reduce the net amount received by the growers to a small margin, but when the C. S. R. R. is completed, all of this will be obviated, and the profits will be tripled or even quadrupled. In view of this there will be heavy outlays by all growers this winter, and next summer the largest stock ever grown here can be expected. The large majority of growers ship to Cincinnati, but Stanley & Rickey send their grapes to Chicago alone. In illustration of the quality of the grapes grown in this section, we will cite one instance: On August 7, Southern Illinois grapes sold in Chicago at 5 cents per pound, on the same day Chattanooga grapes brought 10 cents.

The shipment from this point sometimes is very large; Stanley & Rickey have been known to ship in one day as high as 4,000 pounds. They employ, at times, as high as thirty men in their vineyard. A small portion gather the crops, a larger number are busily employed carefully assorting and picking. In a shipment no over-ripe or rotten grape can remain in a cluster, or the whole lot will be spoiled. The largest and finest clusters raised this season have been by the Steele Bros., who ship to Cincinnati.

In the construction of stands great care must be taken. Sassafras leaves are strewed over the bottom of the drawer, then the grapes are packed very tightly, when they are covered with another layer of leaves, and are thereby kept in a thoroughly fresh condition.

Almost all our grapes are raised on Missionary Ridge. Nearly every cultivated field between Rossville and the East Tennessee, Virginia, and Georgia Railroad tunnel has a vineyard of some size. This country, with its numerous hills, is specially adapted to the culture of grapes, and after rates reasonably profitable to the grower can be obtained on the railroads, this section will become one of the most important grape-growing

localities in the country. It is a lucrative and pleasant investment, and from present appearances we may exclaim before long, with perfect justice, of the "vine clad hills" of Hamilton County.

CHAPTER XLII.

WHITE ELK VINEYARDS, IOWA.

(From the American Wine and Grape Grower for Nov., 1879.)

These vineyards are situated on the west bank of the Mississippi river, in the south-east corner of the State of Iowa, and in and near the city of Keokuk. The wines made there are chiefly Catawba, Concord, Ives, Norton's Virginia, Delaware, Clinton, Iona, and Alvey, and have some reputation in the East, but are better known in the West and South. They are remarkable for the reason that they are the pure juice of the grapes whose names they bear, being neither mingled nor doctored, and are brought to maturity by the Pasteur method, which gives the wines the advantage of a year or more in ripening them for market.

The vineyards were established some ten or twelve years ago by the Hon. Hiram Barney, of New York, formerly Collector under President Lincoln, and now embrace a little less than 100 acres in vines. The vintage product is from 15,000 to 30,000 gallons, and is increasing annually. Mr. Barney, in order to secure the future permanence of the vineyards after he has passed away, has recently transferred their ownership to a corporation known as the "White Elk Vineyard Company,"

in which he is the principal stockholder, with capital stock fixed at $50,000 (although they have cost over $100,000).

The officers are: Hon. John H. Craig, President; Gen. Louis T. Barney, Vice-President; and Hon. Edward Jaeger, Secretary and Treasurer. The Directors are, in addition to the above: Mr. Hambden Buel and Hon. Hiram Barney.

The wealth and position of these gentlemen, in addition to the good repute in which the wines are already held, ought to, and no doubt will, insure the company the desired measure of success.

The origin of the name "White Elk" was somewhat romantic and is as follows: In 1841, Mr. Barney, then a young limb of the law, visited the territory in behalf of certain clients who had invested largely in the claims of the half-breeds of the Sac and Fox tribes of Indians, then residing on the reservations of that name in the southern part of the territory, having about that time obtained a decree of the court settling the title. Late in the month of October, he, with a party of friends and an interpreter, started across the country in carriages and on horseback to the Indian encampment, some 100 miles beyond the lines of civilized habitations; arriving there they were received with great ceremony, and treated with kingly hospitality by Keokuk the then King of the united Sac and Fox tribes, and also by all the lesser chiefs, in imitation of the head one. Mr. Barney and his party remained two or three days and then prepared to return to their homes beyond the Mississippi, but before doing so Mr. Barney thought it worth his while for certain reasons to be adopted into the tribe, and sought Keokuk for the purpose of having the ceremony performed, but not finding him at the moment concluded to take his departure as he came, a simple white man. But the fates had ordered otherwise, for they had proceeded scarcely a mile on their journey before they were

intercepted by Na-She-Kus-Kuk, Chief of the Sac tribe, with fifty mounted Indians, in full war paint and feathers, all charging at full speed. The young chief, who was a magnificent specimen of the red man, standing 6 feet, rode up and made known the fact that he had been sent by Keokuk to perform the ceremony of adoption for his brother the pale face. Mr. Barney having expressed his willingness, Na-She-Kus-Kuk raising his arm gracefully, slowly, and with emphasis, pronounced the words Wa-Be-Me-Shi-Wa, or White Elk, which was the tribal name given to Mr. Barney; all the Indians composing the cavalcade, and a multitude of women and children who had by this time gathered around, took up the word and shouted it over and over again, while the horsemen wheeled and disappeared as quickly as they came. And thus Mr. Barney became the Sac Chief, "White Elk," which name he bestowed upon his vineyards as a memorial of this singular event.

CHAPTER XLIII.

THE PHYLLOXERA PROBLEM.

(*From the Pacific Rural Press.*)

Julius Dresel, of Sonoma, Cal., writes to the *Alta* concerning the danger of the Phylloxera, and what he is doing to guard against it, as follows: Something must be done soon, or shall we continue calmly to stand by and see the vineyards, in the neighborhood of Sonoma for instance, in increasing proportions steadily changing into dead land? In vain I look around, and nowhere can I see any serious steps taken to remedy the fearful evil that is upon us. But how can we afford to remain inactive for another season! Forsooth, then, we had better

prepare ourselves at once to see the 100,000 vines already destroyed, amount to millions. Allow me, therefore, to give you here, my experience and my opinion as to the best means to reconquer the lost ground; for as to averting the destroyer, I think we had better dispense with the application of any chemical preventive. The great prize offered by France for such an invention has not yet been won; and even if it had been, how could we employ, and perhaps more than once, a chemical preparation on stretches of 100 acres, to a depth of 4 feet? And where is the money to come from? And neither is there any reliance to be put on the power of resistance of the younger vines, or on the richness of the soil. My own eyes witnessed the Phylloxera crawling on its victims entirely regardless of individual, young or old, luxurious or lean; all Asiatic varieties of the *Vitis vinifera*, that is to say, every grapevine imported from Europe, has to succumb to the relentless double sting of these myriads of lice—the roots rot! No more is manuring, how much soever to be recommended in other respects, a preservative against the inroads of these insects. As the rings grow wider and wider from the spot where the stone has fallen into the water, be it deep or shallow, so the circle of devastation of the Phylloxera expands from the first point of infection toward the outskirts over rich and poor land, with scarcely any difference; the strong and the weak have to perish alike. In three years the work is done. In the first you will not remark much, excepting perhaps a fading of color on the leaves; in the second, you see the branches no longer hanging down in sweeping boughs, but standing upright, shortened and stiff, with a yellow foliage early in fall; in the third, their appearance is entirely crippled and shorn; they look like old willow stumps, and the horses have to tear them out to be burned.

Under these circumstances, I followed the precedent of the French, who, for sometime, have made experiments with, and ordered Phylloxera-proof vines from Missouri in still increasing quantities. I planted Elvira and Taylor, both white varieties of the *riparia* grape, and *cordifolia*, a wild, red variety of the same family, which has obtained the preference up to this time. Previously I grafted the cuttings indiscriminately with Gutedel, Riessling, Zinfindel, etc., and I see them grow with their grafts just as well as ours; also those that were transferred to the nursery, there to form roots for the next season. Further my own experience does not go, but I put entire confidence in this way to help us out of the scratch, supported as I am not only by the success of the French, as stated in the highly interesting articles of Wetmore, which appeared in the *Alta*, but also by the microscopic examinations of F. Hecker of Belleville, who found the fibre of the varieties of the Frost Grape and the *riparia* so hard and tough that the tiny trunk of the Phylloxera can not well penetrate it. Catawba, Isabella, and many other varieties formerly in use, have been relinquished as not reliable in the same degree, or for other objections.

Here, then, we have a sufficient reason to make use of the above given sorts, as resisting the inroads of the Phylloxera, to make up for losses with new plantations.

I cannot help wondering at those who still continue to trust the Asiatic vines, even for new extensions, when they stand surrounded by the irrepressible hosts of their arch-enemies. No doubt they believe that something fortunate will yet turn up against the Phylloxera. Let us rather be watchful and active—all who are weary and burdened with vineyards—lest we may fall under an impending mortgage foreclosure.

My mode of proceeding is this: I put an exactly-fitting graft of two eyes on the cuttings, having them

first shortened for the uppermost knot, and winding around it, all along the graft-cut, a suitable twine. I have not used any wax, which, perhaps, might do well as a coating. For the manner of grafting, every one may choose the cut he likes best, and thinks suited to answer the purpose. Good care should be taken to prevent the cuttings from getting dry, by keeping them covered with moist soil; sand would be preferable. In this wise one can finish about 175 grafts in a day, sitting snugly at home; some years later, grafting on the stem may cost three times as much work. I leave it to the judgment of my fellow vine-growers, whether they would not rather plant the Missouri vines first in the nursery, there to take root, and graft afterward, before transferring to the vineyard. If orders are given during October, the vines will probably be sent in January, and the planting should be done in March at the latest. Do not expect to get as vigorous and many-eyed cuttings as we are wont to get here; most of the slips are thin and long-linked, but they grow all the same. About the stems which these Missouri vines will make, I cannot speak from experience, but I have not heard any complaints from France; besides, I am inclined to assume that our genial climate will improve their strength, as it did for the Gutedel, and others.

CHAPTER XLIV.

EGG HARBOR WINES—EARLY WINTER GRAPE—COST OF A VINEYARD.

EGG HARBOR WINES.

The following is extracted from an account in the "American Wine and Grape Grower," November, 1879, of a visit to Egg Harbor, N. J. With a view to make their wines better known, the owners of the leading vineyards, at Egg Harbor, some years ago inaugurated an annual reception, to which prominent citizens of Philadelphia and others are invited. On this occasion

"The representative wine-growers who were visited spared no pains to throw open every source of information and provide all possible means of comfort and pleasure for the visitors. After passing upon the well-known merits of the white 'Martha' and red wines of J. Fuller, the party visited Heil's vineyards, where similar wines were tested. Capt. Saalman's favorite, 'Black Rose,' next underwent the trial of the connoisseurs, and the party then visited the leading wine-grower of the place, Julius Hincke, prominent as the man who placed his celebrated 'Iohlink' and 'Franklin' wines in competion with those of France and the rest of the world at the Paris Exhibition. These wines took a medal there, as they had previously done at the Centennial.

"After an address of welcome by Mr. Hincke, ex-President Lucas took occasion to express his gratification over the fact that these wines met with high favor, not only in New York and the other principal cities of America, but also in England and on the European continent. They were superior, he said, to Burgundy wine, and had already raised New Jersey to a place among the leading

wine-growing districts of the world. Count D'Assi coincided with Mr. Lucas, and said he was forced to admit that the wine-growing lands along the Camden and Atlantic Railroad were a successful rival even of the soil from which had come the Falerian that Horace had immortalized. Equally favorable comments were made by a number of gentlemen at the Claret and Catawba vaults of T. H. Bannihr."

NOTE ON THE EARLY VICTOR GRAPE.

BY SAM. MILLER, BLUFFTON, MO.

This grape, grown from seed by John Burr, of Leavenworth, Kansas, is certainly the best of the early grapes that have yet come to my notice. Bunch medium to large; berry size of Isabella, and has the same oblong form, black, with a handsome bloom; pulp soft and sweet, as well as rich, skin thin. It is entirely free from the foxiness of its parent, the Concord. The vine is vigorous, foliage healthy, and immensely productive. He has sent me the fruit three years in succession, and it has improved every year. The past season it bore here with me, and was quite a prize. It ripens about a week earlier than Hartford, and will not only rank high as a table grape, but will also make an excellent wine, if my judgment is worth anything. Mr. B. has also a white variety, fruit of which he sent me, which is quite early, and will give the Lady a hard race, as it is entirely free from foxiness.

COST OF ESTABLISHING A VINEYARD.

This must, of course, vary greatly with the locality, price of labor, manner of preparing the soil, variety planted, manner of training, etc. I give below the cost of an acre in our locality, (Boone Co., Mo.) on ordinary

soil, and with no unusual obstructions, such as stones, stumps, etc.:

Plowing and sub-soiling, three teams	$ 7 00
650 Elvira (or Gœthe) plants, $5 per 100	32 50
Planting	5 00
Cultivating 2 years	30 00
300 Trellis Posts, 8 cts.	24 00
500 lbs. No. 12 Wire, 7 cts. per lb	35 00
Setting Posts and stretching wire	5 00
Total	$138 50

The cost will vary with the varieties.—If Concord are taken, they can be had for $1.50 per 100; Norton's Virginia or Cynthiana will cost from $8 to $15 per 100. Thus, the cost may vary from $120 to $200 per acre.

The above is for a trellis of three wires; for two it will be about $11 to $12 less. The distance is for vines set 6×10 or 8×8, with a row in the center left out for a road.

The returns will vary so much with the locality, and with the season, that it would be useless to speculate upon them here. Every planter can form his own estimate. It will depend upon the price that can be obtained for the grapes or the wine, and many other circumstances which cannot be foreseen in a work like this, which is merely intented to give an outline of the necessary operations.

I have aimed to gather facts from different sections of the country, from eminent grape-growers, and include them in this little book. It will illustrate the different methods and views in different sections, together with some observations made on a recent Eastern trip, and I trust that this Second Part will not be the least interesting portion of the work. To all who have thus contributed I tender my grateful acknowledgments, as well as for the many courtesies and friendly greetings I received from brother grape-growers, which made me feel again and again that there is a free-masonry among members of our profession, which makes us feel at home wherever we clasp the hand of a follower of our gentle craft.

PART III.

AMERICAN WINE MAKING.

CHAPTER XLV.

WINE MAKING.

It can hardly be expected, in a book which only aims to be the guide of the average cultivator, and to render grape growing and wine making easy for the masses, that I should enter into the secrets of the wine dealer and chemist, giving elaborate descriptions of the manufacture of sparkling wines, and the artificial compounds of the so-called sweet wines, *vins de liqueur*, etc. My chief aim is to demonstrate in a simple and plain manner, the rules which are necessary to success. Wine making is a very simple art, which every one with sound common sense may acquire, yet it can not be followed successfully without a strict observance of these rules. I shall be as concise as possible, and hope that this little volume may enable every one, who wishes to do so, to make healthful and palatable wine for his own use, and at the same time to assist the owner of ten or twenty acres of vineyard to convert the products of it into a salable article of commerce.

THE CELLAR.

Before making wine, room should be provided to keep it. If you want to make only a small quantity for your own use, and have a common house-cellar, it will answer the purpose, although not likely to be cool enough in summer. The main consideration is to always have the wine thoroughly fermented and finished during

the first winter. If this is the case, it will keep even in a temperature of 65°, though 45° would be better. But if one wishes to take up wine making as a business, and manufacture several thousand gallons, a special building for the purpose is necessary.

A steep hillside, sloping towards the north, is the most suitable locality, and the most economical and most convenient building is one of three stories. The lower one, for keeping the wine when finished, should be completely underground, the second story, intended for the fermenting cellar, partially so, at least, and the third, intended for the press house, can be entirely above ground, so that the grapes can be conveniently carried into it. The lower story should be well walled and, if possible, arched with stone, though this is not indispensable. If arched, it should be about 18 feet wide by 12 feet high from the floor to the middle of the arch, so that there is room for casks 5 feet long in two rows, one on each side, space enough between the casks and the wall to pass behind them, and a passage of 5 to 6 feet in the center, to allow space for drawing off wine, moving casks, etc. The length can be suited to the wants of the builder; the entrance should, if possible, be even with the ground, and if built into the hillside, it can easily be made so, and the back part of the cellar slightly elevated, so that it will drain towards the door. It is best to have a room in front, so as to keep out the cold air; this can be used for storing empty casks, cellar utensils, etc. The cellar should be well ventilated on the sides by air flues built in the wall, and constructed somewhat like chimneys, commencing at the bottom and terminating above the arch. These are to be closed by a grate and trap door, so that they can be opened at will, to admit air and light. The cellar is to be closed by strong double doors. Place on each side two rows of beams, lengthwise, as layers for the casks, one to be about 2 feet from the wall,

the other 4½ feet. It will be best if the floor is paved with brick or flags.

The second story of the building is intended for the fermenting cellar, and may be made either of stone, which is certainly the most durable, or of wood, if cheaper and more convenient; it need not be arched. It should be, at least, 9 feet high, and partly under ground, with its entrance from the rear, as this will be more convenient. There ought to be holes through the arch of the lower cellar, large enough to admit the passage of a hose, by which the wine can be racked from the casks in the upper cellar into the casks below. This room need not be arched, but should be so constructed that it is free from frost, and can be heated by a stove, if necessary, to regulate the temperature while the must is fermenting. Place layers, or beams, to receive the casks, on both sides, as in the lower cellar.

The third story is above the ground, and is calculated for the press room, with the entrance from the back, and is intended to contain the wine press, grape mill, and fermenting vats, together with all the necessary implements for wine making. The whole is to be covered with a good roof, and there should be a large cistern, to receive all the water from it, and as convenient to the press room as possible, so that the water can be drawn into the room by a force pump. If the press room is so arranged as to be heated by a stove, it will be found convenient in winter as a shop in which to prepare cuttings, etc.

To sum up, there should be: 1st. A cellar to keep the fermented wine altogether below ground, so that it will remain at as even a temperature as possible. 2nd. A fermenting cellar, or good, air tight room, which need not necessarily be below ground, if it can be kept free from frost until about December 15th, to put the must through a rapid and thorough fermentation. 3d. A press room for receiving and washing the grapes, and, when necessary,

passing them through a light fermentation before pressing, with sufficient room for all the implements. 4th. Plenty of good cistern water for all purposes. All the stories, for greater convenience in working, to be connected by hose.

As observed before, any one can make and keep a small quantity of wine for home use, even without a regular wine cellar. One of the most successful wine makers I ever knew, and who afterwards made it by tens of thousands of gallons, stored his first crop in a hole in the ground, 8 feet deep, and planked inside, with a board roof; in this he placed his casks, and covered the whole with earth. But for the cultivator who would make grape growing and wine making his business, a separate wine cellar will become absolutely necessary, and should be built as soon as possible. The expense will be according to the dimensions; a building 30 by 18 feet would cost here now about $1,500, and have a capacity of 5,000 gallons in the lower cellar, provided casks of not less than 500 gallons are used.

CELLAR FURNITURE.

We now come to the utensils necessary for wine making. You need:

1st. A PRESS.—The most convenient one for a medium-sized establishment, to press say not over 5,000 gallons per annum, I have found to be one made at Belleville, Ill. It is compact, takes little space, and it has a false bottom, which can be easily taken off and cleaned. The hopper is in the shape of a double-grooved ring, so that the juice can flow off towards the middle, the outside, and the bottom; it does the work quickly and well. A strong iron screw is in the middle, and is worked by a lever on top. It costs about $35 to $40. It is durable, easily cleaned, and takes little space. A small quantity of grapes can, of course, be pressed with any

kind of a cider press. One will press about a barrel at a time, and twenty barrels can be worked off in a day.

2nd. THE MILL.—For mashing grapes, a simple pair of wooden rollers, connected by cog wheels, and running against each other, so arranged that they can be set by screws to any desired distance apart, will do the work better than anything else, and a boy of ten years can turn them. The rollers are in a frame which can be set over the vat; a hopper on top to receive the grapes, completes the arrangement. The rollers can be either plain or grooved, as desired, and the whole will cost from $12 to $15. Small quantities may be mashed with a wooden pestle in a tub. The rollers should be so set as to break the skins of the berries, but not to crush the seeds or stems.

3d. FERMENTING VATS.—These are best made of poplar wood, and may be of any suitable size, with a capacity of from 100 to 500 gallons. For a larger establishment I would prefer them about 5 feet diameter by 5 feet high, and somewhat narrower at the top than at bottom. They should be well hooped and strong, made of $1^1/_2$-inch lumber, and worked smoothly inside, so that they can be easily cleaned, with a spigot hole near the botton to draw off the must. Their probable cost is about five to six cents per gallon.

4th. CASKS.—These are wanted, of course, of all dimensions. Large casks save room, and are proportionally cheaper; fermentation progresses rapidly in them, but it takes longer for the wine to fine and clear after fermentation is over, than in small casks. They should be of good, well seasoned white oak wood; if steamed before using, so that the tannin is drawn out, so much the better. Larger casks should also have a so-called "manhole," so that a man or boy can slip in and thoroughly clean them when used. I do not advise larger casks than 500 gallons, as it takes too long to fill them, and they are,

therefore, unhandy, except for very large establishments. These are about 5 feet long by 5 feet diameter, and should be placed on strong beams in the cellar, about 18 inches above the floor and 15 to 18 inches from the wall, so as to enable you to examine them at any time and clean them of mould or cobwebs. Their cost at present is about 7 cents per gallon. Imported Rhenish wine casks, holding from 80 to 160 gallons each, are also very good if they have not been allowed to sour or become mouldy, but, of course, they take up more room in proportion than do large casks.

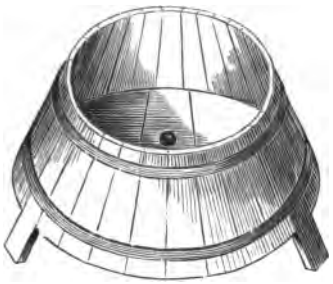


Fig. 28.—WOODEN FUNNEL.

5th. A STRONG WOODEN FUNNEL.—This is oblong, with a copper pipe in the bottom, and has two short wooden legs, so that it will set firmly on the cask. Any good cooper can make one. See figure 28.

6th. TUBS TO BE USED IN PRESSING.—Any good pine or cedar tubs will do for the purpose. Also clean tin or wooden pails should be provided in abundance.

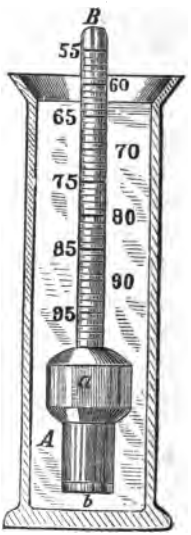


Fig. 29.

7th. A SACCHAROMETER OR MUST SCALE.—This is important and you can not do without, as they are the only sure guides as to quality of the must, and you can not make wine rationally or with certainty of success, unless you know what amount of sugar and acid the must contains. Oechsle's is the one most commonly

used, and can be had in any optical establishment. They are made of glass, platina, or silver, at prices ranging from $3 to $10.

Figure 29 shows must scale (silver) and test tube. With the scale you should also have a long glass, or tin tube made for the purpose of holding the must while testing it.

An Acidimeter.—The one invented and patented by Henry Twitchell is simple, and can be used with accuracy

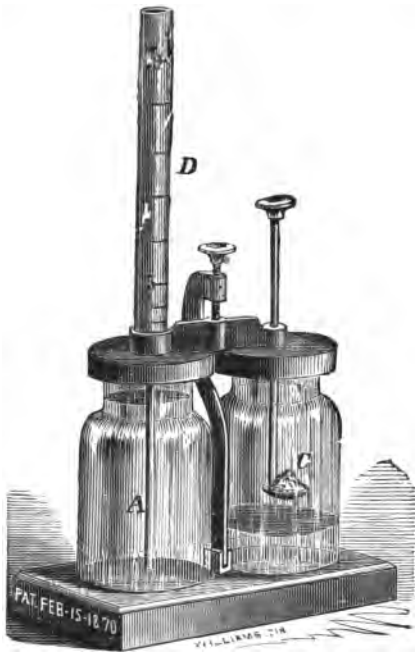


Fig. 30.—ACIDIMETER.

by beginners. It is a timely invention, as it took long practice to work correctly with either Otto's or Geissler's. It is accompanied with full directions for its use. Figure 30 gives an illustration of the Acidimeter.

GATHERING THE GRAPES.

Having our cellar built, and stocked with the necessary implements, we can now proceed to gather the grapes. The proper time to do this depends very much upon the varieties. The *æstivalis*, and most of the *cordifolia* class, in short, all grapes which have an agreeable flavor—one which we wish to have in its fullest development in the must or wine—we ought to have thoroughly ripe. The riper the grapes, the more fully will their peculiar flavor be developed, the less acid and the more sugar will they contain. We must, therefore, learn the nature of our grapes before we know when to gather them. In the varieties of *Labrusca*, at least in most of them, their peculiar flavor is not desirable in its highest development, and is generally characterized as "foxy." A good many of them also, for instance, Concord and Martha, do not contain the proper amount of acid when fully ripe, to bear the necessary dilution of this strong, foxy taste, and as they must be "Gallized" at any rate, to be palatable, it is not advisable to let them get over ripe. I would advise, therefore, to take these, and, in short, all the varieties with a strong, foxy, and disagreeable aroma, when fully colored, and let those varieties with an agreeable aroma hang long, in order to obtain their flavor in its full perfection and delicacy; and also to develop the greatest amount of sugar and diminish the acid. The best evidences of a grape being thoroughly ripe are: 1st. The stem turns brown and begins to shrivel. 2d. The berry begins to shrivel around the stem. 3d. The skin is thin and transparent. 4th. The juice becomes very sweet, and adheres to the fingers like honey or molasses.

It is often advisable to gather twice, as many bunches will ripen later than others. If the ripest are gathered first, the remainder will ripen quicker, and a uniform product can thus be obtained. The first implements needed for the

gathering are clean wooden or tin pails, and sharp knives, or better still, the small shears spoken of in a former part of this work. Each gatherer is provided with a pail, or two may go together, having a pail each, so that one can empty and the other keep filling. If there are a good many unripe berries on the bunches, these may be put into a separate pail, and also all that are soft, as they will make an inferior wine. The bunch is cut with as short a stem as possible, as the stems contain a great deal of acid and tannin; every unripe, dry, or decayed berry is to be picked out, so that none but perfectly sound, ripe berries remain.

Fig. 31.—CARRYING VAT.

We also need a carrying vat, to carry the grapes to the mill or wagon, if the vineyard is any distance from the cellar. This is made of half-inch pine lumber 3 feet high, 10 inches wide at bottom, 20 inches at top, being flat on one side, where it comes against the back; it is bound with thin iron hoops. It is carried by two leather straps running over the shoulders, as shown in figure 31, and will contain about 8 or 10 pails, or 2 to $2^1/_2$ bushels of grapes. The carrier can easily take it through the rows and lean it against a post until filled, and then carry the grapes directly to the press room, if close by, if too far, place tubs or vats on the wagon, into which the grapes may be emptied. The utmost cleanliness should be observed in all the apparatus, and no tub, vat, or pail should be used which is in the least mouldy, as the must will at once acquire any foreign taste. Everything should be perfectly clean and sweet, and a strict supervision

kept up, that the laborers do not drop crumbs of bread, etc., among the grapes, as these will cause acetous fermentation. The weather should be dry and fair, and the grapes dry when gathered.

MAKING THE WINE.

The apparatus being all ready, we can commence operations, and here we must know, first and foremost, what kind of wine we intend to make, whether light-colored and smooth, or dark-colored and astringent. The character of the wine depends chiefly on its fermentation on the husks, although of course we cannot make an entirely white wine out of a grape with very dark juice, nor a red wine, except by artificial coloring, out of a white grape, or one with very light-colored juice. The general rule is, however, that fermentation draws acid, tannin, color, and flavor out of the skins and stems, so that if we desire to develop the greatest amount of these, we must let the must remain longer on the husks; if, on the contrary, we desire a mild, smooth wine, it should not ferment long on the husks. Many of the red wines of Europe are left on the husks for several months, and the wine is drawn from them when it is about finished.

To make white, or light-colored, smooth wine, the grapes which were gathered and mashed during the day can be pressed and put into the cask during the following night. The mill is placed above the fermenting vat, and the grapes are mashed as soon as they are carried in, or hauled to the press house. The vat is covered with a cloth during the day. If the season has been good, and you have a perfect grape to deal with, such a one as has all the ingredients of a good wine in the proper proportions, it will make good wine without any other addition. If not, sugar, or sugar and water, must be added, but I will speak of this in a separate chapter. With the Concord grape, many make both a white and a red wine. The

white is made by simply pressing very lightly as soon as the grapes are mashed, so as to drain off the first run of the juice before it has acquired any color from the skins. The husks are then thrown into the fermenting vat, water and sugar added, and fermented several days; then pressed, and thus a red wine is produced. I must say that I prefer the wine gained by fermenting, say 24 hours, in a temperature of 65° to 80° on the husks, and all pressed together. It generally contains all the ingredients in better proportions, while the white wine seldom has the due proportion of acid and tannin, and the red generally has an excess of acid, tannin, and flavor. Of course the temperature has a great influence on fermentation, as in warm weather it progresses much more rapidly, and the pressing should be done sooner than in cool weather. It is entirely optional with the wine-maker what kind of wine he produces; he can make it to suit himself, and soon learns how to do it. The longer he ferments his must, the more astringent and rough his wine will be; and the sooner and lighter he presses, the less character will the wine acquire, though it will be much more delicate and smooth.

Before filling the casks they should be well prepared. They should be perfectly clean and sweet without the slightest mouldiness. If new, they should be steamed, or filled with pure water, and allowed to soak for several days, then emptied, and scalded with two or three gallons of boiling wine. This quantity is for a cask of say 500 gallons. Or, if this is not convenient, put in, say a peck of unslaked lime, and about five gallons of water, then put in the bung and turn the cask about, so that all parts of it are touched by the mixture. Then pour out the lime water, and wash with water, then rinse with a decoction of vine leaves, or warm wine, or better still, pour in a pint of pure alcohol or grape brandy, and light it by a match. The fumes of the burning brandy

will penetrate the wood, and make you secure against any taint in the wine. But do not bung the cask while the brandy is burning, or you may have an explosion before you know it. The same may be done with mouldy casks, to make them fresh and serviceable again.

The casks can then be filled with the must, either completely, if it is intended that the must should ferment above, as it is called, or under, when the cask is not completely filled, so that the husks, scums, etc., which the must will throw to the surface during fermentation, will remain in the cask. Both methods have their advantages, but after long practice, I now follow the latter, leaving empty space enough until rapid fermentation is over, so that all remains in the cask. As long as fermentation lasts, and the gas escapes, all goes right, and a few vine leaves over the bung-hole, on which a small sack of sand is laid, are sufficient to close it. Of course it must be closely watched, and the bung closed as soon as fermentation ceases, when the casks must be filled with wine kept for that purpose in a separate cask. If, during fermentation, cool weather should set in, and the temperature fall below 60°, the fermenting cellar should be warmed by a stove. But this will rarely be the case, as the vintage should be over before cold weather sets in.

When violent fermentation has ceased, and the must has become quiet, the cask should be closed with a tight bung of white oak or poplar wood. To make dark-red wine, the treatment differs, as it is the object, as before remarked, to get a wine of the darkest color, highest flavor, and of a certain astringency, which it will only attain by fermenting on the husks. The must is, in that case, allowed to ferment on the husks for from three to six days, when the husks which rise to the surface should often be pressed down and stirred through the must, to

prevent their souring. The must is then drawn off below, by a faucet, and the husks pressed. If it is desired to make only a dark-colored wine, without so much astringency, and of great body, the grapes are allowed to hang until they are very ripe, even shrivelled; and stemmed, as the stems contain a large amount of acid and tannin, and give the wine a rough and bitter taste. In this manner the celebrated red wines of Burgundy, and the best brands of France and Germany, are made. Many of them are even allowed to go through the whole process of fermentation before pressing, and the husks are filled into the cask with the must, through a door above, and remain there until the clear wine is drawn off. This is generally not desirable here, however, as our red grapes contain sufficient astringency and color without this process. After the wine has become quiet it is looked after frequently, and the casks filled to the bung. As there is more or less evaporation, this should be done every two or three weeks, always using wine of the same or similar character. In two to three months the wine ought to be clear and bright, and should then be racked, *i. e.*, drawn from the lees by means of a faucet, and put into clean, sweet casks. It is very important here, again, that the casks into which it is drawn, are sweet and clean, or "wine green." For must, fresh brandy or whiskey casks may be used; but after the wine has fermented, it will not do to use such, as the wine acquires the smell and taste of the liquor. When a cask has been emptied, it should be carefully cleaned, as before described, by entering at the door or man-hole, or, with smaller casks, by taking out the head, as the lees are very adhesive, and will not wash out readily, but should be brushed off. After it is thoroughly cleansed it may be fumigated slightly, by burning a small piece of sulphured paper, or a nutmeg in it, and then filled. To keep empty casks in good condition, they should, after cleaning, be allowed

to become thoroughly dry, when they are sulphured, closed tightly, and laid away in the cellar. The sulphuring should be repeated every six weeks. When wanted for use, they are rinsed with cold water.

For racking the wine we should have: 1st. A large, brass or wooden faucet. 2d. Pails of a peculiar shape, narrow at the top, to prevent wastage. 3d. A wooden funnel, as described before, to hold about six gallons.

In racking, first loosen the bung of the cask. Then, after loosening the wooden peg, and closing the tap hole, let your assistant hold the pail opposite the hole. You hold the faucet with your right hand, and with the left withdraw the plug, inserting the faucet quickly; drive it in firmly and you are ready for the work.

Do not fully open the faucet at first, because the first pailful is generally not quite clear, and should run slowly. This, and the last from the lees, are generally put into a cask together, and allowed to settle, when, in a few weeks, it will become clear, and make a good wine. As soon as the wine runs clear and limpid, it can be put into the cask, and you can let it run as fast as the faucet will allow, opening it to its fullest capacity. When the wine has run off down to the tap hole, the cask may be carefully raised at the other end, one inserting a piece of board or a brick under it, while the other lifts slowly and gently. This may be repeated several times, as long as the wine runs clear, and when it becomes slightly cloudy, keep the cloudy wine to put with what ran out first. As soon as it becomes thick and muddy it is time to stop. The door is then taken out of the cask and the lees emptied out. They will, if distilled, make a fine flavored and strong brandy. If your cellar is built according to the plan already given, you can attach a hose to the faucet and run your wine from the fermenting cellar into the cellar and casks below, which is a great saving of time and wastage. The must can also be run from the press-

UNIVERSITY OF CALIFORNIA

room into the casks in the fermenting cellar in the same manner.

We should keep in mind, in all operations, the kind of wine we intend to make. In white and light-colored wines, we desire delicacy of bouquet and smoothness of taste; in red wines for medicinal or stomachic use, we desire astringency, body, and a decided and characteristic flavor. White and light-colored wines should, therefore, be racked as soon as they are clear, while red wines may remain longer on the lees. Both can be modified, by treatment, to meet the peculiar taste; a red wine may be made smoother, and a white wine more astringent, by longer or shorter fermentation on the husks and lees. We can thus conform to the taste of the consumer. If the prevailing taste is for light-colored, smooth and delicate wines, we can make them so, by pressing soon, and racking soon and frequently. If a dark-colored, astringent wine is desired, we can ferment on the husks, and leave it on the lees a longer period. There is a medium course in this, as in all things, and the intelligent wine-maker will soon find the rules which should guide him, and with a little practice discover the method which will give him the best results with a certain variety.

Among the varieties suited for white wines, and which should be treated as such, I will name the Elvira, Gœthe, Herbemont, Martha, Massasoit, Uhland, Catawba, Delaware, and Taylor, and among the varieties for dark-red wines, Cynthiana, Norton's Virginia, Lenoir, Alvey, Clinton, and Ives' Seedling. The Concord can be used for both, or can be made light-red. For Sherry wine, use the Hermann, Rulander, and Cunningham. These latter require a sort of medium treatment; it is desirable to develop their peculiar flavor; it is not desirable to have them astringent or dark-colored. Fermenting on the husks 24 to 36 hours, in a temperature of 60° to 70°, will be about right for them. It is very important that the

temperature should not vary much during fermentation, and that the first fermentation on the husks, and for the first week following, should be rapid and uninterrupted. If the wine goes into the next summer fully fermented and finished, clear and limpid, there is little danger of its becoming cloudy and diseased afterwards, even if it must be kept in a changeable temperature.

AFTER TREATMENT OF THE WINE.

Even if the wine was perfectly clear when drawn off, in February and March, when it should be racked for the second time, it will go through a second fermentation, however slight this may be, as soon as warm weather sets in, say in June and July. The clearer and better developed the wine was when last racked, the slighter this will be, for only the lees yet remaining in it which the young wine has not entirely deposited will act as the ferment. It is not safe or judicious, therefore, to bottle the wine before this second fermentation is over. As soon as the wine has become perfectly quiet and clear again, generally about September, it can be bottled, or sold by the cask. For bottling wine we need: 1st. Clean bottles. 2d. Good corks, which must be scalded with hot water first, to draw out all impurities, and soften them, and then be soaked in cold water. 3d. A small funnel. 4th. A small faucet. 5th. A light, wooden mallet to drive in the corks.

After the faucet has been inserted in the cask, fill your bottles so that there will be about an inch of room between the cork and the wine. Let them stand a few minutes before you drive in the cork, which should be of full size, and made to fit by compressing at one end. Then drive in the cork with the mallet, and lay the bottles, either in sand on the cellar floor, or on a rack made for that purpose. They should be so laid that the wine covers the cork, to exclude all air. The greater bulk

of the wine, however, can safely be sold now, or kept in casks. All the wine to be kept should be racked once about every six months, and the casks kept well filled.

DISEASES OF WINE AND THEIR REMEDIES.

Wine properly made, and with all ingredients in right proportion, will seldom suffer from any disease. Cases may arise, however, which may make it necessary to give it a different treatment, or fine it by artificial means.

TREATMENT OF FLAT AND TURBID WINE.

The cause of flat wine is generally lack of tannin. If the wine has a peculiar flat, soft taste, and looks cloudy, this is uniformly the case. Draw the wine into another cask, which has been well sulphured, and add some pulverized tannin, which can be had at any drug store. The tannin may be dissolved either in water or wine, about an ounce to every two hundred gallons of wine, and poured in at the bung, after which the wine should be well stirred with a stick inserted through the bung-hole. Should it not become clear in about three weeks, it must be fined. This can be done by adding about an ounce of powdered gum arabic, or isinglass, to each forty gallons. The gum arabic will dissolve in cold water, but isinglass requires hot water; stir the wine well when it has been poured in. Or take some wine out of the cask, and, for each forty gallons of wine, add the whites of ten eggs, whipped to foam with the wine taken out; pour this mixture into the cask, stir well, and bung tightly. After a week the wine will generally be clear, and should then be drawn off. An easier and speedier method to fine is to put it through a filter filled with paper pulp, but the apparatus is somewhat costly. As it is accompanied by directions for use to those who purchase it, it would be superfluous to describe it here. As stated before, if the wine has been properly made and fermented, such

procedures will seldom be necessary, and the wine will be sound and clear without any artificial means. The observant and rational wine-maker will seldom be troubled by any mishaps, and his wines will be palatable and bright without any such treatment.

USES OF THE HUSKS AND LEES.

These can be distilled, and will make a very strong, fine flavored brandy. The husks are stamped down into empty barrels or vats, as close as possible, with a cover of clay made over them, to exclude the air. They will then undergo a fermentation and be ready for distilling in about a month. They should be taken fresh from the press, for if they remain exposed to the air they become mouldy. The lees can be distilled immediately. Good fresh lees or husks from rather astringent wines or grapes, are also an excellent remedy when the wine becomes flat, as described before. If such wine is fermented on the husks again for a day or two, it will generally become sound and bright.

CHAPTER XLVI.

DR. GALL'S AND PETIOL'S METHODS OF WINE MAKING.

So far, I have only spoken of the handling of the raw product of Nature, taking for granted that we had a fair must in good condition to work with. But this unfortunately is rarely the case, and the natural juice of the grape seldom contains all the elementary constituents of a good wine in the proper proportions. In fact, very many of our American varieties are very imperfect even in the best seasons, and contain generally a superabundance of acid and flavoring matter or aroma. What then is the intelligent operator to do? Shall he use them as they are, although he is aware they are imperfect, and produce a poor, undrinkable, unsalable, and even unhealthful article? Or shall he, with the reason and knowledge God has given him, seek to remedy Nature's imperfections, dilute the acid and aroma, add sugar, if necessary, and thus make a salable, pleasant, and healthful beverage? I think the intelligent wine-makers —and it is only for them I am writing, can not hesitate which course to take.

I am aware that I am treading on dangerous ground, that I have been severely censured for my advocacy of Dr. Gall in my former little book, but truth remains truth, whether assailed or not, and the laws of chemistry will not change to please any of the "Simon Pure Naturalists," who rail against Gallizing, because they do not know anything about its true principles. But let me put myself right before my readers, before entering upon the details of the operation. I advocate Gallizing only so

far as it is the best means of improving otherwise imperfect must, not as an indiscriminate means of increasing the quantity at the expense of quality. Only so far as by the addition of water and sugar, an imperfect must can be made the most perfect, is Gallizing not only justifiable, but a necessity. As soon as it aims only at increasing the quantity without regard to quality, it is reprehensible, and should be frowned down. This may be called *gallon*izing, not Gallizing; and that these gallonizers have done a great deal of mischief by bringing their trash before the public, and calling it wine, can not be denied. But those who, from a mistaken idea that a wine to be good and healthful, must be natural, as they call it, have made it as Nature gave it, and have, therefore, disgusted the palates of refined wine connoisseurs by their pure, but weak, foxy, and acid Concords, and Ives, etc., thus doing even more to bring American wines into discredit than the gallonizers. Both of these, the natural wine-makers and the gallonizers, have been the curse and bane of our wine markets; those who, in the innocent belief that they were tasting fair samples of American wines, swallowed their compounds and were disgusted, and when they met with good productions, were deterred from tasting again. The true course lies in the middle, as usual. The wine-maker has certain unerring guides, which teach him, with a little practice and experimenting, "thus far shalt thou go, but no farther."

Having thus defined what we intend to do, which is simply to improve our must, if deficient, let us, to see our way clearly before us, examine as to the constituent parts of must or grape juice. A chemical analysis of must shows the following result:

Grape juice contains water, sugar, free acids, tannin, gummy and mucous substances or gluten, coloring matter, fragrant, or flavoring substances (aroma, bouquet).

REESE LIBRARY
UNIVERSITY
CALIFORNIA

A good or normal must should contain all these ingredients in due proportion. If there is an excess of one, and a lack of the other, it can not make a perfect wine. This would seem apparent to every reasoning wine maker. Must which contains all of these in exactly the right proportion we call a perfect or normal must; and only by determining the amount of each of the ingredients in this so-called normal must, can we gain the knowledge that will enable us to improve must which has not the necessary proportion of each. The frequency of unfavorable seasons in Europe, set intelligent men to thinking; their grapes were sadly deficient in sugar, did not ripen fully, and also lacked in flavor. How then could this defect be remedied, and a grape crop which was almost worthless from its want of sugar and excess of acids, be made to yield at least a fair article, instead of the sour and unsalable wine generally produced in such seasons? Among the foremost who experimented with this object in view I will here mention Chaptal, Petiol, but especially Dr. Ludwig Gall, who has at last reduced the whole science of wine making to such a mathematical certainty, that we are amazed that so simple a process should not have been discovered long ago. It is the old story of the egg of Columbus, but the poor wine-makers of Germany and France, and we in this country also, are none the less indebted to those intelligent and persevering men for the incalculable benefits they have conferred upon us.

The production of good wine is thus reduced to a science; though we cannot, perhaps, in a bad season, produce as high flavored and delicate wines as in the best years, we can now always make a fair article, by following the simple rules laid down by Dr. Gall. Nay, as most of our grapes, in a good season, contain flavor in excess, we can often make fully as palatable wine in a poor season, when that flavor is not so fully

developed, by merely adding water and sugar to dilute the acid. In this respect we can make a more uniform product from our strongly flavored varieties, than the Europeans can from their delicately flavored varieties of *vinifera*, which are deficient in flavor in bad seasons.

When this method was first introduced, it was calumniated and despised, called adulteration of wine, and even prohibited by the governments of Europe, but Dr. Gall fearlessly challenged his opponents to have his wines analyzed by the most eminent chemists. This was repeatedly done, and the results showed that they could find nothing but such ingredients as pure wine should contain; and since men like Von Babo, Dobereiner, and others, have openly endorsed and recommended Gallizing, prejudice is giving way before the light of scientific knowledge. The same will be the case here. Intelligent men will see that there is nothing reprehensible in the practice, and the public will, in time, prefer the properly Gallized, and, therefore, more palatable and more healthful wines, to the foxy and acid productions of the sticklers for natural wines.

To determine the amount of sugar and acids in the must, we need a few necessary implements. The first is the must scale, or Saccharometer, already mentioned in the necessary implements for wine making (see fig. 29.) The most suitable one now in use is Oechsle's Must Scale, constructed on the principle that the instrument sinks the deeper into any fluid the thinner it is, or the less sugar it contains. It is generally made of silver, or German silver, although it is also made of glass. *A* represents a hollow cylinder, best made of glass, filled with must to the brim, into which place the must scale, *B*. This is composed of the hollow float, *a*, which keeps it suspended in the fluid; of the weight, *b*, for holding it in a perpendicular position, and the scale, divided by small lines into from 50° to 100°. Before the scale is placed

in the must, draw it several times through the mouth to moisten it, but allow no saliva to adhere to it. When the scale ceases to descend, note the degree to which it has sunk, after which, press it down with the finger a few degrees further, and on its standing still again, the line to which the must reaches, indicates its so-called weight, expressed by degrees. The must should have a temperature of 65° to 70°, be weighed in an entirely fresh state, before it shows any sign of fermentation, and should be free from husks; if strained through a piece of mosquito bar, or small sieve all the better.

This instrument, which is indispensable to every one who intends to make wine rationally, can now be had from prominent opticians in nearly every large town. It indicates the amount of sugar in the must, and its use is so simple, that every one can soon become familiar with it. The next step in the improvement of must was to determine the amount of acids it contained, and this problem has also been successfully solved by the invention of the Acidimeter.

As remarked before, Twitchell's Acidimeter is the best now in use, and as it is accompanied by full directions for use, I need not repeat them here, further than to say that to ascertain the acidity of must, it should be tested when pressed, as many of our pulpy grapes contain nearly all their acid in the pulp, and the instrument will, therefore, not give a fair indication until fermentation has drawn out the acid.

A normal must, to suit the prevailing taste here, should contain about four-thousandths parts of acids, while in Europe it varies from four and a half to seven-thousandths, as the taste there is generally in favor of more acid wines. I cannot do better here than quote from Dr. Gall, who gives the following directions as a guide to distinguish and determine the proportion of acids which

a must should contain to be still agreeable to the palate, and good :

"Chemists distinguish the acids contained in the grape as the vinous, malic, grape, citric, tannic, gelatinous, and para-citric acids. Whether all of these are contained in the must, or which of them, is of small moment for us to know. For the practical wine-maker it is sufficient to know, with full certainty, that, as the grape ripens, while the proportion of sugar increases, the quantity of acids continually diminishes, and hence, by leaving the grapes on the vines as long as possible, we have a double means of improving their products, the must or wine.

"All wines, without exception, to be of good and agreeable taste, must contain from four and a half to seven-thousandths part of free acids, and each must containing more than seven-thousandths part of free acids may be considered as having too little water and sugar in proportion to its acids.

"In all the wine-growing countries of Europe, for a number of years past, experience has proved that a corresponding addition of sugar and water is the means of converting the sourest must, not only into a good drinkable wine, but also into as good a wine as can be produced in favorable years, except in that peculiar and delicate aroma found only in the must of well-ripened grapes, and which must, and will, always distinguish the wines made in the best seasons from those made in poor seasons.

"The Saccharometer and Acidimeter, properly used, will give us the exact knowledge of what the must contains and what it lacks, and we have the means at hand, by adding water, to reduce the acids to their proper proportions, and by adding sugar, to increase the amount of sugar the must should contain ; in other words, we can change the poor must of indifferent seasons into the normal must of the best seasons in everything, except its

bouquet or aroma, thereby converting an unwholesome and disagreeable drink into an agreeable and healthful one."

THE CHANGE OF THE MUST INTO WINE.

Let us glance for a few moments at this wonderful, simple, and yet so complicated process, to give a clearer insight into the functions which man has to perform to assist Nature, and have her work for him, to attain the desired end. I cannot do better than to quote again from Dr. Gall. He says: "To form a correct opinion of what may, and can, be done, in the manufacture of wine, we must be thoroughly convinced that Nature, in her operations, has other objects in view than merely to serve man as his careful cook and butler. Had the highest object of the Creator, in the creation of the grape, been simply to combine in the juice of the fruit nothing but what is indispensable to the formation of the delicious beverage for the accommodation of man, it might have been still easier done for him by at once filling the berries with wine already made. But in the production of fruits, the first object of all is to provide for the propagation and preservation of the species. Each fruit contains the germ of a new plant, and a quantity of nutritious matter surrounding and developing that germ. The general belief is that this nutritious matter, and even the peculiar combination in which it is found in the fruit, has been made directly for the immediate use of man. This, however, is a mistake. The nutritious matter of the grape, as in the apple, pear, or any similar product, is designed by Nature only to serve as the first nourishment of the future plant, the germ of which lies in it. There are thousand of fruits of no use whatever, and even noxious to man, and there are thousands more, which, before they can be used, must be divested of certain parts, necessary, indeed, to the nutrition of the future

plant, but unfit, in their present state, for the use or nourishment of man. For instance, barley contains starch, mucilaginous sugar, gum, adhesive matter, vegetable albumen, phosphate of lime, oil, fibre, and water. All these are necessary for the formation of roots, stalks, leaves, flowers, and the new grain; but for the manufacture of beer, the brewer needs only the first three substances. The same rule applies to the grape.

"In this use of the grape, all depends upon the judgment of man to select such of its parts as he wishes, and by his skill he adapts and applies them in the manner best for his purposes. In eating the grape he throws away the skins and seeds; for raisins, he evaporates the water, retaining only the solid parts, from which, when he uses them, he rejects the seeds. If he manufactures must he lets the skins remain. In making wine he sets free the carbonic acid contained in the must, and removes the lees, gum, tartar, and, in short, everything deposited during and immediately after fermentation, as well as when it is put into casks and bottles. He not only removes from the wine its sediments, but watches the fermentation and checks it as soon as vinous fermentation is over, and the formation of vinegar about to begin. He refines his wine by an addition of foreign substances; if necessary, he sulphurizes it, and, by one means or another, remedies its diseases.

"The manufacture of wine is thus a many-sided art, and he who does not understand it, or knows not how to guide and direct the powers of Nature to his own purposes, may as well give up all hopes of success in it."

So far Dr. Gall; and to the intelligent and unbiased mind, the truth and force of these remarks will be apparent. How absurd then are the blind ravings of those who speak of "natural" wines, and condemn as adulteration and fraud every addition of sugar and water to the must by man, in seasons when Nature has not fully

done her part. There is no such thing as "natural wine," for wine, especially good wine, is the product of art, and an artificial process from beginning to end. An all-wise Creator gave us the raw materials for our sustenance and convenience, but gave us also reasoning powers to convert them to our use, and make them more wholesome and palatable. Shall we eat the raw potato simply because it is a natural production, or are we justified in cooking and roasting it, to make it more palatable and wholesome? How would the "naturalist" stare if some fine morning his good wife would set a cup filled with raw coffee beans and some water before him, instead of his usual fragrant beverage, and a dish of raw wheat instead of the usual light rolls which tempt his appetite? Yet the making of coffee and bread are even less natural, more artificial, than the addition of sugar and water to the must. Would not the wine-maker act as foolishly as the housewife who puts raw coffee and wheat upon the table, instead of the fragrant cup and white roll, if he has it in his power to remedy the deficiencies of Nature by such means as she herself supplies in good seasons, and which ought, and would be in the must, but for unfavorable circumstances over which we have no control? Wine thus improved is just as pure as if the water and sugar had naturally been in the grapes in the right proportions, just as beneficial to health, and only the fanatical numskull can call it adulterated. But these prejudices will disappear before the light of science and truth, and have disappeared already, until there is not a single establishment of any consequence, either here or in Europe, where it is not followed, either secretly or openly, and to the manifest improvement of their wines.

Yet, strange to say, these same "naturalists" will enjoy sparkling wines with a great deal of gusto, although they are a still more artificial product. And many of them will smack their lips over some rare so-called, "Old

Port," which has never seen a grape, but is some skillful concoction of logwood, spices, tartaric acid, syrup, alcohol, and tannin. "Oh, consistency, thou art a jewel!"

Let us now observe the change which fermentation makes in converting the must into wine. The nitrogenous compounds—vegetable albumen, gluten—(which are contained in the grape, and which are dissolved in the must as completely as the sugar), under certain circumstances turn into the fermenting principle, and so change the must into wine. This change is brought about by the fermenting substance coming in contact with the air, and receiving oxygen from it, in consequence of which it coagulates, and shows itself in the turbid state of must, or young wine. The coagulation of the lees takes place but gradually, and just in the degree that the exhausted lees settle. The sugar generally turns into alcohol. The acids remain partly as tartaric acid, are partly turned into ether, or settle with the lees, crystallize, and adhere to the bottom of the cask. The etheric oil or aroma remains, and develops into bouquet, as does the tannin, to a certain degree. The albumen and gluten principally settle, although a small portion of them remains in the wine. The coloring matter and extractive principle remain, but change somewhat by fermentation.

Thus it is, that must containing a large amount of sugar, needs a longer time to become clear, while that containing but a small portion soon becomes clear. Many southern wines retain a certain amount of sugar undecomposed; such are called sweet, or liqueur wines, whereas wines in which the whole of the sugar has been decomposed in the fermentation, are called sour or dry wines.

I have thought it necessary to be thus explicit to give my readers an insight into the general principles which should govern us in wine making. I have quoted freely from the excellent work of Dr. Gall. We will now see

how we can reduce these principles to practice. I will illustrate by an example.

NORMAL MUST.

Experiments continued for a number of years have proved that, in favorable seasons, grape juice contains on an average in 1,000 pounds :

Sugar	240	pounds.
Acids	6	"
Water	754	"
	1,000	

This proportion would constitute what I call a normal must. But suppose that in an inferior season the must contains, instead of the above, as follows :

Sugar	150	pounds.
Acids	9	"
Water	841	"
	1,000	

What should we do to bring such a must to the condition of a normal must ? We calculate thus : If, with 6 lbs. of acids in a normal must, there is 240 lbs. of sugar, how much is wanted for 9 lbs. of acids ? Answer.—360 lbs. Our next problem is : If, with 6 lbs. of acids in a normal must, 754 lbs. of water appear, how much water is required for 9 pounds of acids ? Answer.—1,131 lbs. As, therefore, the must which we intend to improve by neutralizing its acids, should contain 360 lbs. of sugar, 9 lbs. of acids, and 1,131 lbs. of water, but contains already 150 lbs. of sugar, 9 lbs. of acid, and 841 lbs. of water, there remain to be added, 210 lbs. of sugar, no acids, and 290 lbs. of water.

By ameliorating a quantity of 1,000 lbs. of must, by 210 lbs. sugar, and 290 lbs. of water, we obtain 1,500 lbs. of must, consisting of the same properties as the normal must, which makes a first class wine.

This is wine making in Europe, according to Dr. Gall's

method. Now let us see how we can adapt it to American grapes and wines.

THE MUST OF AMERICAN GRAPES.

If we closely examine the musts of most of our American grapes, we find that they not only contain an excess of acids in inferior seasons, but even a greater superabundance of flavor or aroma, and of tannin and coloring matter. There is such an abundance of flavor in many of them, that, were the quantity doubled by addition of sugar and water, there would still be an abundance. With some varieties, such as Concord and Ives, if fermented on the husks, it is so strongly foxy, as to be disagreeable, and as the pulp of them is very tough and slippery, they can not be pressed clean without fermentation. We must, therefore, not only ameliorate the acid, but also the flavor and astringency, of which the tannin contained in the stems is the principal cause. Therefore, it is even more important to us than to European wine-makers, to gain the knowledge to Gallize our wines properly. By proper management we can change must, which would otherwise make a disagreeable wine, into one in which everything is in its right proportion, and which will thus suit a customer to whose fastidious taste it would otherwise be repugnant. True, our grapes will ripen better here, so that we can, in most seasons, produce a wine without a great excess of acids, but the American taste requires a less acid wine any way, and we must dilute the aroma to make our wines salable. Here another difficulty presents itself. The riper a grape is, the more of its peculiar aroma will it develop, and if we would let our Concords hang until they are so ripe that the acid has been reduced to the proper proportion, the aroma becomes so strong that it is very repugnant to a refined taste. What course remains then for us to take? Shall we let our grapes hang until the acid is reduced,

and make an abominably, foxy wine, which no one will buy? Or shall we gather our grapes when well colored, Gallize the must until the acid and flavor are reduced to the proper amount, and thus produce a very fair, light-red wine, palatable to most, and a refreshing and invigorating beverage to all? I think the latter is the best course, and the only reasonable one.

At that time the must of Concord grapes will generally weigh about 65° to 70° on Oechsle's Scale, and the Acidimeter will indicate about 6°. Now we make our calculation as follows: A normal must, to suit the palate here, should indicate about 80°, and show 4° on the Acidimeter. To reduce the acid to 4° we must add one-third water, or, in other words, if we have 480 lbs. of Concord grapes, which would make 40 gallons of pure juice, we must add 20 gallons of water. To these 20 additional gallons of water, we must add 40 lbs. of the best crushed sugar, to bring the water up to the ratio of normal must, 80°. But we have also a discrepancy of 15° in the must if it indicated 65°. To bring this also up to 80° we must add three-eighths pound of sugar to every gallon of must, or 15 lbs. to the 40 gallons. The addition to 480 lbs. of grapes would then be as follows: 20 gallons of water, 55 lbs. of sugar, and no acid, making 60 gallons of must of normal proportions, instead of 40 of pure juice. These will be about the right proportions for a pleasant and handsome wine, of good color, pleasant flavor, and not too acid to suit the general taste, with also the proper proportion of tannin, which will be marketable sooner, and at a much higher price, than if we had allowed the grapes to hang a month longer, and then pressed the natural must, which would, perhaps, not contain an excess of acid then, but certainly an excess of foxy flavor and tannin.

Different grapes will, of course, require different treat-

ment. It is only by experimenting that we can find how much each variety should be Gallized to produce the best possible wine. Nor are the grapes alike in all seasons, and one season's product of the same grape may require different treatment than the other. To illustrate a case in point: While experimenting with varieties, I had, in the summer of 1866, enough of Rulander grapes, then a new variety, to make 5 gallons of pure juice, which, when tried by the saccharometer, showed 104°. This was pressed and put into a 5-gallon cask. The husks were thrown back into the fermenting vat, and 5 gallons of water, with 15 lbs. of sugar added, bringing the water up to 100°, and fermented 48 hours, then pressed and put into another 5-gallon cask. When pressing these my vintner thought that there was too much flavor and character in the husks left to be thrown away, and he once more added 5 gallons of water, with 15 lbs. of sugar, and fermented this three days and three nights, then pressed, and put into a third 5-gallon cask. The wines became clear at about the same time, had nearly the same color, and when tested by several connoisseurs, they pronounced all good, but No. 2 the smoothest and finest wine; No. 1 rather the fullest, but somewhat more astringent, while No. 3 was but little inferior to No. 2. This verdict was given without knowing how the wines had been made. We then mixed the three wines, equal parts, in a tumbler, and upon testing, found the mixture a better wine than either was separately. The three, after this trial, were put together, and made a wine like very fine Golden Sherry, which took the first premium as best light-colored wine of any variety, at the Combined Exhibition of the Longworth Wine House and the American Grape Growers' Association, at Cincinnati, in 1867, in competition with over 30 samples of the finest Catawbas, Delawares, and Herbemont, as well as numerous other first premiums wherever exhibited. I have

made hundreds of such experiments, modifying the treatment with the character of the variety. I know, therefore, whereof I speak. Of course the above is an extreme case; but few varieties have so much flavor and character as the Rulander, and the treatment which produced so fine a wine from this grape, would have made a very flat "Maxatawney," a grape which has but little character. When making such experiments I made it a rule always to keep some of the pure juice by itself, for comparison, and the tests were, therefore, made with the greatest fairness, and with but one aim, that is, to ascertain how the best possible wine could be made from any variety. Were I to give more of these experiments here, my readers would, perhaps, be even more astonished than I was, at the results; but facts are stubborn, and can not be controverted. Seeing, and in this instance, tasting, is believing, and as I kept a very careful record of all cellar operations, there could be no mistakes.

I will here quote one of my first experiments made with very imperfectly ripened Catawba grapes, made in 1865, when that grape ripened very poorly, on account of mildew and rot. I found, on testing the must, that it would only show from 52° to 70°, while a normal Catawba must should weigh at least 80° in good seasons. My calculations for making the additions which I knew were imperatively necessary, were based upon the following reasons: If normal must weighs 80°, and this averages but 60°, there is a deficiency of half a pound of sugar to the gallon of must. But there should also be an excess of acid of at least one-third, as the Catawba has a superabundance of acid in even the most favorable seasons. I must, therefore, add at least one-third more water to dilute the acid, and to this water add 2 lbs. of sugar to each gallon, so that the whole mixture will weigh 80°. I did so, fermented all on the husks 36 hours, and the result was a very fine, golden-colored Catawba, which I sold

before it was six months old, at the highest figures Catawba wines were then bringing, to the first buyer who came and tasted it.

As the Catawba constitutes yet, to a great extent, the product of Eastern and Northern vineyards, it may be well to give a few more hints to my readers on the management of Catawba must. This variety contains, as already mentioned, a very large amount of acids, as well as a great deal of tannin and flavor. This must be apparent to every one who has ever eaten well-ripened Catawba grapes. It has besides a very tough and acid center or pulp, of which every one can convince himself when eating even the most thoroughly ripened Catawba grapes. The first taste is delightful, but let him press the pulp and skins closely and he will find that the after taste is sour and rough. Of course fermentation extracts all this, and while the Catawba contains all the ingredients for a palatable wine, these two are present to a very great excess, and make the wine sour, astringent, and unpalatable. What then is necessary? We must simply add water and sugar, even in the best vintages, to ameliorate this, and much more in inferior seasons, and we will make better wines than are now in the market and much more wholesome, than the so-called "Sweet Catawbas," which are villainous compounds of unripe grape juice, raw spirits, and syrup added after fermentation, and afford an excuse for the habitual tippler to say that he drinks only wine, not whiskey. It would be better if he did take spirits so far as the effects on his system are concerned, for such mixtures intoxicate nearly as much, and the deleterious stuff they contain is only glossed over by the syrup. If Catawba wine is rationally Gallized, it makes a very pleasant, high-flavored wine, and those who prefer to have it still sweeter, can add sugar when drinking it, to suit their taste. If this were done, we would have no need of these "Sweet Catawbas"

which now disgrace the wine trade of the country, and pure, light wine would have a better chance to become the universal beverage of the people. I do not pretend to give fixed rules to do this; even were I competent, the product varies too much with the locality and the season. I merely attempt to show the way. Let every one experiment, and note the results, and he will soon see how far he should go to make the best wine, for he should not go farther. Let the best product always be his aim, not quantity.

The Concord, now so generally grown, is another variety which is immensely improved by Gallizing, and, as before remarked, to make the most palatable wine, should not be allowed to get too ripe. When the grapes are fully and evenly colored on the bunch, it is time to gather it, and I would rather add more sugar, than wait until it is fully ripe, as then its flavor becomes too strong and apparent. The same rule may be applied to the Martha, which is best when fairly ripe, but when overripe loses its sprightliness, and becomes foxy, while its wine is, when made in time, fully as good as the best Catawba. The addition of from one-third to one-half water and sugar, or in other words, from two-thirds to one gallon of water and sugar to every 12 lbs. of grapes, and the whole mixture brought to 80° on Oechsle's Scale, fermented about 36 to 48 hours on the husks, in a temperature of 75°, will generally make the most palatable wine, from most of the *Labrusca* class and their hybrids. The Gœthe, under the same treatment, will make an excellent white wine, sprightly and pleasant, with just enough of its fine Frontignan flavor to make it agreeable.

Those who wish to satisfy themselves, can easily make the experiment, as I did, cautiously, and step by step. Let them make a small quantity of pure juice-wine, so-called, and compare it with wines made at the same time, of the same grapes, but Gallized more or less, and

keep a careful record of the operation. This was my method, and I aimed always at improving the quality; so soon as I found the quality diminished, I considered it time to stop, while so long as the quality improved, I thought it safe to advance. Consider each variety a separate subject for experiment, it will not do to trust to surmises and guess work, nor can any rule be given that will apply to all varieties alike.

So far I have spoken mostly of the *Labruscas* and their hybrids. When we come to the *æstivalis* class we have entirely different material to deal with, and while we may, and can, by judicious Gallizing, improve some of them, and make them smoother and more palatable, yet with those which are used chiefly for medical purposes [as Norton's Virginia, which has become a great remedy for dysentery, bowel complaints, and cholera infantum], it will be better to let the grapes hang until they are dead ripe. Stem them before crushing, add very little or no water, and ferment on the husks for a week, or even longer. Their flavor is not objectionable, and the object here is, to make an astringent and heavy wine, and develop all the medicinal qualities which that grape possesses in such an eminent degree. To make simply a good Claret from it, of course it can be Gallized, and will make even a more pleasant wine for every day use. This class, however, also differs as much in its varieties as the *Labrusca*. I have already cited an example of the Rulander, which has a decided Sherry flavor. The Hermann, a seedling of the Norton's, is another with a strong Sherry character, so marked that the pure juice has too strong a flavor, yet when properly Gallized it makes a delightful deep-yellow wine, equal to any Golden Sherry, and the white seedling from it seems to be a still greater improvement, as it is much more delicate and juicy than its parent. And here let me make a prediction, to which long years of careful observation have led me, and which

is shared by all of the prominent grape-growers of the State, so far as I know. It is this, that the grape-growers of the State, if they turn their attention chiefly to the best of the *æstivalis*, the Cynthiana, Norton's Virginia, Neosho, and others, which have not been so fully tried, will, at no distant day, excel the products of the choicest vineyards of the European Continent, and may safely challenge the world in the production of the choicest Burgundies, Clarets, and Sherries, and the sooner we turn our attention to them the better. California, and even the East, may excel us in the quantity, and rival us in the quality of white wines, but from all the information I can obtain, they can not come near to our red wines, which are even now the equals of the best wines of Burgundy. This is our proper field, and the sooner we concentrate our energies upon it, the better will it be for us. They are, at the same time, Phylloxera-proof, and we need not fear that they will "go back" upon us.

In the *cordifolia* we have still another material. The grapes of this class may be said to occupy a position between the *Labruscas* and the *æstivalis* class. Nearly all contain considerable acid, and an abundance of flavor, and are much improved by judicious Gallizing; but as their skin and pulp is tender, they need not be fermented on the husks for any length of time. Twenty-four hours of lively fermentation will generally be sufficient for the Elvira, Taylor, and Clinton. They promise to furnish us another class of wines, and as they are also Phylloxera-proof, we may consider these two classes as the foundation of future grape growing. We have but just commenced experimenting with this class, but the great success achieved by Mr. Rommel and others justify the most sanguine hopes. I was particularly struck with some wines shown me by Mr. James Ricketts, from several Clinton seedlings, foremost among which are the

Bacchus and Ariadne. They show a new class of wines, light red in color, of great body, and very peculiar flavor. Should these varieties prove to be adapted to more general culture, we may expect some remarkable wines from them.

Of course these are only general hints, which are calculated to show my wine-making friends the way they must go, to make palatable and wholesome wines. I shall not attempt to go into details about varieties, as even these differ so much in different localities that no rules for their treatment could be given to apply in all cases. Nor do I pretend to be perfect, but I am convinced more and more every day, how little I yet know, and how much I have to learn.

In all my experiments I aimed to come as near the normal must of the variety I experimented with as possible, in the specific gravity of the water and must, when mixed. I have no doubt that we also have much to learn yet in the judicious mixing of several kinds of grapes. Experiments in that line have already shown astonishing results, and the art of blending and cutting wines, so well understood and practised in the best cellars of Europe, is yet in its infancy here, but will, no doubt, have a great influence upon our future products. But this art can only be based upon a thorough knowledge of the characteristics of each individual variety, and he who undertakes the task must bring to it a peculiar talent and highly developed taste, as well as the nicest discrimination of the traits of each variety. If our grape growing and wine making had the experience of several centuries to look back upon, we could base our operations upon certain knowledge. Now we are feeling our way. The pioneers who first made the clearings in our woods, greatly rejoiced when they could eat the first hoe-cake from the corn their industry had planted in the wilderness, and still more enjoyed the rolls made of their first

wheat. Like them are we overjoyed at what we have achieved, and know that the grape, so lately but the child of these same forests, is susceptible of as much improvement and as great a change, as that which converted the old time clearing, with its simple log cabin, into the pleasant homestead with its smiling and tasteful lawn and orchard, rich with golden fruits. And those who intend to be the winners in this race, must have the pluck and perseverance of the old frontier pioneers, hoping always, even in the most gloomy times, for brighter days, and never doubting of the end.

Dr. Gall recommended grape sugar as the best to be used for Gallizing. This is made from potato starch, but all the samples I have yet tried are not pure enough, and leave an unpleasant, bitter taste in the wine. I have, therefore, used the best and purest cane sugar, and as it also dissolves more readily in water, I prefer it, and have found it to answer every purpose. I have lately tasted a sugar made from the Minnesota or Early Amber cane, which seems to be well adapted to the purpose, and if the production of its sugar assumes the dimensions it now promises, we may have an important advantage over our former method, in a cheaper and better article of sugar. The best cane sugar when dissolved in water in the proportion of 2 lbs. of sugar to the gallon, will show upon the scale about 80°. In making additions to Catawba, Gœthe, Martha, Elvira, and all the lighter wines, it takes about 2 lbs. of sugar to the gallon of water, to produce the weight of normal must of these varieties. For Norton's Virginia, Cynthiana, Rulander, and all the heavier wines, it will take, at least, $2^1/_2$ lbs. of sugar to the gallon of water, as their normal must ranges from 100° to 110°, and sometimes 120°, in the product of the best seasons.

As a general rule it may be assumed, however, that our native grapes, with their strong flavor and abundance

of tannin and coloring matter, will admit, nay, require, much more Gallizing than the more delicate and finer flavored grapes of Europe. How far we can go with each variety I do not presume to say, and only experience can safely guide us here. It must be apparent to every one who is ever so slightly acquainted with wine making, how widely different the varieties are in their characteristics and constituents. I have tried only to give an outline of the necessary operations, as well as the principles underlying the science of wine making, have quoted facts, only so far as I have become familiar with them through long practice and observation. No one can be better convinced than I am, how much we have yet to learn, and how wide the field that lies before us. I have been severely censured for the open advocacy of the method of Dr. Gall, even by those who have practised it as zealously and not always confined themselves as much to its true limits as I have tried to do. Many of our best wine-makers think that we should keep the knowledge we have gained to ourselves, and profit by it in secret, instead of openly facing a prejudice which we know to exist. But it has always been a deep-seated conviction with me that knowledge, like God's sun, should be the common property of all; that it is a duty every citizen owes to the community in which he lives, to impart freely what he may know, to every one. Only thus can we progress in this fast age, where progress is the watchword. Truth and justice need never fear the light, they can only gain by close investigation.

And here let us look at the probable effects these methods of improvement are likely to have upon grape culture, and ask ourselves: Is there anything reprehensible in them, any reason why they should not become generally known? I think the answer is easily found. Gallized wines contain nothing, which fermented grape juice, in its purest and most perfect condition, does

not also contain. They are, therefore, as pure as any grape juice can be, with the consideration in their favor, that they contain all the ingredients in their proper proportion.

It is a matter of course that careless and slovenly workers have failed, and will continue to fail, in making good wine by this, or any other method, but this cannot be used as an argument against it. To make a good article the peculiarities of each variety must be closely studied, and we must not think that water and sugar will accomplish everything. Its use should be limited, and becomes abuse as soon as it oversteps that limit.

But I will hope that I have contributed my mite to the fund of universal knowledge, and if this little volume only aids every farmer in the land, who can grow grapes, to make a few barrels of pure, light wine for family use, to take the place of poor whiskey and brandy, now the bane and curse of so many households, I am more than repaid for the labor of many a lonely early morning hour it has cost me. Mine has been an incessantly busy life, and the time for these scribblings has been stolen mostly from the "small, still hours." I know of no holidays, and have often had to force exhausted nature to the task. This must be my excuse for its many imperfections. But I flatter myself that I am not entirely mistaken, when I think I send it on a temperance mission, perhaps more true and, therefore, more effective than any Murphy movement. I have always looked upon the general use of pure, light wine as the best temperance measure that could be adopted. A glass of wine, used early in the morning, I have found to be the best preventive against malaria, and nothing revives the sinking energies of the worn out laborer better during a hot summer day, as I know from actual experience. I have known it to save life in dangerous diseases, and could cite many instances did time and space permit.

Let us all then further the cause of grape-culture. The laborer by producing fruit, the mechanic by inventions, the scientist by improving our methods, the lawgiver by wise laws in its favor, and all others by using its products in moderation, as one of the best gifts from the fountain of all that is good, pure, and beautiful.

CHAPTER XLVII.

WINE MAKING RENDERED EASY.

Perhaps it may have seemed as if I was only writing for the benefit of those who can follow grape growing and wine making on a larger scale, with abundant means at their command, to build commodious cellars, plant large vineyards, and hire laborers to do the work. This is not the case, however. If I have given the outlines of larger operations it is because our object should always be to attain perfection in everything; I have never for a moment lost sight of the interests of those, who, like myself, have to commence at the lowest round of the ladder, who have to make a small beginning, and work their way up through untold difficulties. There is not an operation in the vineyard, from the clearing of the unbroken forest and prairie, to the finishing touch given to the wine at its last racking, which I have not performed and am not thoroughly familiar with, and I can, therefore, fully sympathize with the poor laborer, who has nothing but his industrious hands, and an honest intention to succeed.

While it may hardly be advisable now, in these days of low prices and light demand for wine, to begin grape growing as a means of support, with the hope of realizing a handsome income from it in the course of a few

years, yet there is no reason why every farmer should not have a small vineyard, grow his own grapes, and make his barrel or two of wine, or why every owner of a garden should be without enough grapes for the use of the family.

Grape-vines of the more common varieties are very cheap now, and an outlay of $5 to $10 will buy one hundred to two hundred vines—enough to make a start with. Plant these, at any rate, if you cannot do more, and grow your own vines hereafter to enlarge your vineyard. Wire for trellis is also very cheap now, and it is not needed the first year or two. A few hundred vines can be easily kept in order before breakfast; let the children help you, they can do a great deal of the lighter work, and will learn to take a delight in it. And when your first crop of grapes ripens, and you can make a few barrels of wine, if you have no press or commodious cellar, you can find a cider press somewhere, and room in the cellar of one of your neighbors to store it. One of our most successful wine-growers commenced his operations with a simple hole in the ground, dug under his house, and his first wine-press was merely a large beam, let into a tree, which acted as a lever upon the grapes, with a press bed, also of his own making. His vineyard and wine cellars are now among the best in the county, and although he no longer lives to enjoy it, his family are left in affluent circumstances, and grape growing alone has made them wealthy. Besides, we have got down to the lowest prices, and as the prospects for the grape-growers of the Old World, and even of California, darken on account of the Phylloxera, our own begin to brighten. We know that we have something we can depend upon, and feel that better days will come again for the grape-growers and wine-makers of the country.

Of course it is not advisable to keep the wine over summer in an indifferent cellar, but if it is good, as it

ought to be, you can easily dispose of it as soon as clear. Or you can dispose of your grapes, if you can not or will not make them into wine, to some neighbor, or market them yourself. Nearly all of our small country towns afford a ready market for a small quantity, indeed often a better one than do the large cities.

Another way to make grape growing and wine making easy, is to form grape and fruit colonies. There are locations enough in all the States of the Union, where suitable lands for this purpose can be had cheap. The advantages of such colonies can be easily seen. If each one has a small piece of suitable land (and he does not need a large tract for this business), they can assist each other in plowing and sub-soiling, and will thus be able to do with fewer animals, by preparing the soil first for one, then for the other, the ravages of birds and insects will hardly be felt, the neighbors can join together in building a cellar, where all can store their wine, and of which one can take the management. They can market their product easier, obtain better prices, and lower rates of transportation to large cities, than single individuals, and also make a better and more uniform product.

There are thousands of acres of land well adapted for the purpose, in Missouri and other States, which could be had at very low prices, where the virgin soil waits only the bidding of intelligent and combined labor, to bring forth the richest fruits. There is room for thousands—may it soon be filled with willing hearts and hands to undertake the task.

If our hopes are not so sanguine, the immediate gains not as great, as they were fifteen years ago—yet we have a surer basis to work upon than at that time, and our sobered expectations are more apt to be realized, and even excelled, than then. If we aim at the best products only, rather than at quantity, we are not so likely to overstock the market, and the increased prices we obtain will more

than make up for it. It is much easier to make a start, labor is cheaper, vines are lower, and all the material we use, as well as the land, is lower, and it will be safe to assume that it will not cost half as much to obtain a start now as then.

We will have to work early and late, however, with head and hands, for it is not an easy task upon which the grape-grower enters. It is not the life of a sluggard, nor the romantic idyl of poetic leisure. But what of that? Our task is the production of one of God's noblest gifts to man, and we will follow it with hopeful hearts, in the confidence that He will send His sunshine as well as His showers, to gladden our hearts and to further our work, until it is crowned by a rich harvest of purple and golden clusters, and their juice is changed into "Wine that maketh glad the heart of man."

CHAPTER XLVIII.

SPECIES USED FOR STOCKS AND THEIR PREPARATION.

Grape culture in the Golden State differs so essentially from that in Missouri and the East, that practices followed there are inadmissible here, or can only be applied with essential modifications. The innumerable varieties of *Vitis vinifera*, or Asiatic grape, form the leading class of grapes here, and succeed admirably in the moderate climate and dry summers of California. This makes an addition to the classification of vines necessary, especially as other native species have become better known, and promise to become important factors as stocks, in their resistance to Phylloxera, to which all the varieties of *V. vinifera* succumb. A portion of the native species of the vine are described on page 12 and the following pages; what is given here is supplementary to that.

VITIS VINIFERA, Linnæus (Asiatic or European grape). —Leaves more or less lobed and serrated, smooth and glossy on the upper side, generally more delicate in texture than the native American species; the wood more stocky, and shorter-jointed. The fruit differs so much in the varieties that it would be useless to attempt a description here. Its general characteristics are, however, a thin skin, a greater abundance of juice, and in the fleshy varieties a crackling texture of the flesh, without the tough and slimy pulp of the *Labrusca*.

VITIS RUPESTRIS, Scheele (Bush Grape).—Vine with very short joints and numerous branches, growing more like a bush or shrub than a vine, with small, heart-shaped, shining leaves, smooth on both sides. Berry small, mostly black (although white varieties have been found), juicy, without pulp; bunch small, seldom containing more than a dozen berries. A native of Southern Missouri, Arkan-

REESE LIBRARY
UNIVERSITY
CALIFORNIA

sas, and Texas, where it grows on dry, flinty hillsides, either supporting itself or climbing over low bushes. It has very firm, shining, thin roots, and has lately attracted great attention in France as a resistant stock for grafting. It makes a good, deep-colored wine, but will hardly afford enough to be profitable as a direct producer. Propagates readily from cuttings.

VITIS CALIFORNICA, Bentham (California Grape).—This is found everywhere throughout the State, along the ravines and water courses, seldom on dry ground. It is a strong, vigorous grower, clambering to the tops of trees and trailing along the ground. Wood smooth, light-brown, long and thin, but short-jointed; leaves heart-shaped, downy on both sides, though much more so on the lower; young shoots and leaves of a peculiar whitish tinge; tendrils numerous, reddish. Bunch long and loose; berries small, round, black; roots very numerous and strong, but thick, and soft in texture, with a tendency to go down perpendicularly. Reports are conflicting about its propagation from cuttings; some say it grows easily, others claim that it strikes root with difficulty. Its resistant qualities do not appear to be fully determined; its strong growth is in its favor, while the softness of its roots are an unfavorable indication.

VITIS ARIZONICA, Engelmann (Arizona Vine).—This differs very much from the preceding in its habit and general appearance. While the California vine trails over the ground, the Arizona is a very upright grower. Wood smooth, yellowish, slender, and long-jointed; leaves heart-shaped, shining, and smooth on both sides. The roots are not so soft as those of the California grape, resembling those of the *riparia*, though not quite so firm. I have not seen the fruit, but creditable samples of wine have been made of it. Its chief value will be as a resistant grafting stock, although its value for that purpose is not yet fully established.

VITIS CANDICANS, Engelmann (Mustang Grape of Texas).—I have not observed this vine in its native habitat, but am told that it is a strong grower, climbing to the tops of the tallest trees. Leaves deeply lobed, almost like those of a watermelon, downy above and below, though more so on the lower side; growth long and straggling. Said to be fully resistant to phylloxera, but difficult to propagate from cuttings.

All of these four species grow readily from seeds, as does the *riparia*. For grafting stock, my preference would be *riparia* and *rupestris*, as they are strong growers, and seem to flourish in all kinds of soil.

PROPAGATION.

All that has been said in the first part of the book will also apply here, with perhaps some modifications to suit the soil and climate. Most of the vineyards of *vinifera* thus far planted, were started directly with cuttings, set in early spring. As all the varieties of this grow very readily from cuttings, this seemed to be the easiest and cheapest mode, and was universally followed, although the cuttings used varied in length from fifteen to thirty inches, according to the practice followed by the different planters. A great many, however, begin to prefer rooted vines, started in a nursery, as they make a more even stand, and also produce sooner.

I would not advise any one, however, with the ravages of the phylloxera in some parts of the State before his eyes, to use anything but resistant vines for stocks, and to graft these afterwards, if desired, with the best *vinifera* varieties. For the purpose, I would obtain cuttings of either *riparia* or *rupestris*, from ten to twelve inches long, and plant them in the nursery for one year, where they will make good, stocky plants, to be transferred to the vineyard the next year, and grafted the second or third spring, according to their strength. The

cost will but be a trifle more, as good cuttings of these varieties can be obtained, grown in the State, for about eight dollars per thousand, and the vines will pay for the additional trouble of grafting, by their increased yield and greater vigor. The seeds of the *riparia* and *rupestris*, if sown in nursery rows, will vegetate readily, and make good plants, although not so strong as the cuttings.

THE NURSERY.

For the nursery select a good, fertile piece of land, with deep, rather sandy soil, if it can be had. Plow deeply in fall or early winter, as soon as the first rains have fully saturated the soil, and plow again early in spring, just before planting. The deeper the ground is plowed, the better will it hold moisture, and I have found, by experience, that pulverizing the soil well, making it deep and mellow, and frequently stirring it during the summer, to keep it porous, is more successful than irrigation, and raises better and more hardy plants. The cuttings need uniform warmth as well as moisture, and irrigation has a tendency to cool the ground at the base of the cuttings too much. These sudden changes from warm to cold, are anything but beneficial to the young plant in its most tender period. This treatment will apply to all cuttings, Asiatic or American, and also to seedlings. For the nursery I prefer the cuttings even shorter than usual, say between eight and ten inches long, as they can be planted perpendicularly, and will make stronger roots at the base than longer cuttings, which will make numerous weak roots at every joint. Cuttings, as well as seeds, are generally planted in March or April, when the ground has become warm, and will work well. Cuttings can be made at any time during the winter, as soon as the wood is fully ripened, and kept and planted as described in the first part of this book, Chapter III. I have found it very convenient to make the rows three

and a half feet apart, placing the cuttings but an inch apart in the rows. A horse cultivator, with the centre tooth taken out, is to be run on both sides of the rows, ridging up slightly to the cuttings, and this should be repeated once a week during May, June, and July.

As grafting should be done in the vineyard, I will give the most practical method there.

CHAPTER XLIX.

THE VINEYARD.—LOCATION, SOIL, AND PREPARATION.

Perhaps there is no other country which presents a greater diversity of soils and situations than this State does, and this is often seen in localities not more than fifty or a hundred feet apart. On the same hillside, a tough clay, commonly called "adobe" here, may change into white alkali soil within a hundred feet, which in its turn may give place to loose, stony soil, and this again to red, volcanic soil, which contains a good deal of iron. The valleys of Northern California are subject to late frosts in early spring, and early frosts in fall, but even these generally follow certain low streaks, where the soil is not so well drained; so that one side of the valley may be comparatively exempt from frosts, while the other suffers very frequently. The valleys have generally the richest and most friable soil, produce the heaviest crops, and they are also easier of cultivation; while the hillsides, with proper soil, will produce finer quality, though less in quantity, and are more secure from frost.

On the hillsides, my choice would be the side of hills sloping towards the east and south, as they are more sheltered from destructive winds, and not so exposed to the afternoon sun, which is apt to scald the grapes. Of hillside soils, my first choice would be, especially for red

wines, the red volcanic soil, or black soil mixed with sand and small stones. Such a soil will drain and work well without washing, is warm, and will give wines of deep color, body, and rich in tannin. Next to this would come the clay, or adobe soil, for, although difficult to work, and needing constant stirring in summer to keep the surface mellow, it is very fertile, and will produce wines of good quality in abundance, if well worked. My third choice would be a stony soil, loose and friable, which generally produces well also, after the vines have become established. The poorest of all our hill lands is the white, alkali soil, which does not seem to suit vines at all, as they grow very slowly; therefore I would not have any of this soil if I could help it. But, unfortunately, we find more or less of it in all locations, and can hardly avoid it altogether. The best we can do is, to look out that there is not too much of it. In choosing a location, the purchaser should also see that his soil is of sufficient depth, at least two or three feet above the bed rock, so that the roots of the vine can find moisture in our dry summers, which they can only do when the soil is deep enough. Large oaks, intermingled with mountain laurel and hazel undergrowth, mixed with hillside ferns, are generally indications of a soil well adapted to the grape. In the valleys, guard against frosty locations, which I would not have under any consideration. It is too discouraging to see the promise of a bountiful crop swept away by the frosts of a single night, and to live in constant dread that this may happen.

Very steep hillsides, though they may produce good wines, are very difficult to cultivate, and liable to wash; they should therefore also be avoided.

PREPARATION OF THE GROUND.

Having first cleared the ground of all obstacles, stumps, trees, stones, etc., it should be plowed as deep as possi-

ble with a good four-horse team and plow, following with a subsoil plow in the same furrow. What has been said on preparing the soil, in the first part of the book, will also apply here. The ground cannot be prepared too well; what is worth doing at all, is worth doing well.

For planting, the ground is generally laid off in two-acre blocks; if the vines are planted eight by eight feet, the usual distance, the blocks contain forty-eight vines in the rows lengthwise by twenty-four vines crosswise, with alleys or avenues sixteen feet wide between, making five hundred and seventy-six vines to the acre. Having harrowed and rolled the ground well, to give it a smooth surface, we are ready for marking. Small stakes of redwood, fifteen inches long by half an inch in diameter, are used for the purpose. Establish the four outside lines of the block first, by driving in stakes every eight feet, then stretch one line lengthwise, and another line across, with an active boy at each end to move the line to the next stake, one puts down the marks where the two lines cross each other. If you have a line at each side of the block, and another man, the work can be done still quicker, as two rows can be marked at the same time.

Of course, the distance between the vines can be changed *ad libitum*, but I find eight feet a very convenient distance, giving ample room for cultivation without crowding the vines too much.

We can now proceed to planting. As this has already been described in the first part of the book, I need not dwell on it very long. Should cuttings, however, be planted, instead of rooted vines, I would advise planting with a spade instead of a crowbar, as is very often done. The iron bar may answer in sandy soil, where the sand will naturally settle around the base of the cutting with the first rain. But in soils of any consistency, the spade is decidedly better, and takes but little more time. Throw

out the soil with the spade to the depth you wish to plant, then place the cutting down in the hole, throw in fine soil, and firm it well to the base of the cutting with the foot, letting the upper end come out at the stake, leaving one or two eyes above the surface; then fill up the hole to the top, leaving a small mound around the upper bud.

CHAPTER L.

THE VINEYARD.—SELECTION OF VARIETIES.

As remarked before, I would not run the risk of planting a vineyard with varieties of the Vinifera, even in districts not as yet affected by phylloxera. This scourge, sooner or later, will be carried all over the State, and make itself felt everywhere, except perhaps in those districts which have a sandy soil, or which can be inundated. But even on such soils, I firmly believe that the little additional cost of the plants of resistant stocks and the grafting will be doubly repaid by the increased vigor of the vines and their greater productiveness, a fact which is already well established in France.

But whether you plant Vinifera cuttings or resistant stocks for grafting afterwards, or for immediate bearing, plant and graft none but the best varieties, those which will make such wines, or yield such raisins or fruit as will find a ready and remunerative market. Our motto should be "Excelsior!" We can make good wines, wines that will rank with any of the world's best products, if we have the suitable material and manage it properly and skilfully. The depression in the markets only a few short years ago, was caused mainly by the

fact that the great bulk of wines were made from the Mission grape, many of them poorly made and handled carelessly; at that time wines went a-begging at ten to twelve cents per gallon, and grapes could hardly find buyers at eight and ten dollars per ton. These facts ought to show us that our wines, to gain and secure a world-wide market, and even to take the place of foreign importations in this country, must be of a quality that need not shun competition anywhere. That we have the material to do this, no one can doubt who has seen and tested some of the really choice wines already produced, made by some of our best vintners in different sections of the State. But the great trouble is now, that we have not enough of these really choice wines to supply one-tenth of the demand for them, and that our dealers are forced to blend the finer wines with the low grades, in order to get rid of the inferior stock at all. The grower should consider in the first place, that those who buy his grapes must spend the same amount for labor to make and handle a poor product, that it takes the same amount of casks and apparatus to make and keep the wine, that it is more difficult to handle, and that it costs the same amount of freight to send a gallon of poor or inferior wine to the Eastern markets that it does for good. It takes a greater amount of labor to sell it even at half price; for it is an old saying, that "good wine needs no bush," and the grower would perhaps not censure the dealer so much for what is mostly his own fault. Let us therefore all strive to plant only the best varieties, suited to our soil and locality. Our red volcanic soils are better adapted to the production of choice red wines, as are most of our adobe lands, than the valleys, which will make lighter colored and milder wines, and are therefore better suited for the production of white wines than of red.

That the selection of varieties for such a diversity of

REESE LIBRARY
UNIVERSITY
CALIFORNIA

soils and of climate must yet be somewhat of an experiment, is self-evident. If, therefore, there are vineyards already established in one's immediate neighborhood, it will be best to examine them, see what succeeds best there, and choose accordingly. But if there is no such guide, or the neighbors cultivate only the common varieties, it will pay one to go to some location similar to his, where there is a good, careful grower, when the grapes are ripe, examine them, and get his opinion as to their value. Two of the best places in the State, perhaps, for this purpose, are the vineyards of Mr. H. W. Crabb, at Oakville, Napa Co., and the vineyards and cellars of Mr. Chas. Lefranc, at San Jose, Santa Clara Co. The first has a collection of over three hundred varieties, perhaps the largest in the State, Mr. C. is a skilful wine maker, and a thoroughly practical man, who takes great pains to keep his varieties true to name. Mr. Lefranc has taken great pains in improving and growing the best French varieties, and has given the business close attention. Mr. G. Groezinger, at Yountville, Napa Co., is also a very painstaking and intelligent wine grower, cultivating choice varieties. The following list is the result of observations made mostly in their vineyards. It comprises only a small number of the very best, taking both high quality and productiveness into consideration, and from looking carefully over the selections of others, as well as from personal experience with some of the varieties. There are many more which may be as valuable, but have not been as fully tried as these. These are given separately, as "promising well." I have also given their many synonyms by which they are distributed and known in different parts of the State, as far as I have been able to find them. It would lead too far in a work of this condensed character to give their full descriptions. These can be found in other and larger French and German works, where they are

also completely illustrated. I have only given the general characteristics of the fruit and its quality for wine.

FOR RED WINE.

BLACK BURGUNDY.—Syn. Petite Pinot. Vine very hardy, a compact and moderate grower, very productive. Bunch medium, compact; berry below medium, oblong, black, juicy, sweet. Makes a dark-red wine of fine flavor, very soft and full.

GAMAY MCGUEY.—Synonyms. Tinto, Rouge de Cantal. Rather slender grower, very productive. Bunch small, compact; berry black, very juicy, with a sprightly purple juice. Makes a first-class claret.

GROSSE BLAUE.—Vigorous and productive. Bunch medium, compact; berry medium, oblong, black, juicy, spicy. Makes a fine dark-red wine.

LENOIR.—Syns. Jacques, Black Spanish, Devereaux, American, with resistant roots, vigorous and healthy foliage, productive. Bunch long and loose; berry small, round, black, with deep purple juice. Makes a very dark-colored wine of good quality, but especially valuable for blending with and coloring other wines.

ZINFANDEL. — Syns. Zinfindel, Zierfahndel. Perhaps the best known and most generally planted of all our red-wine grapes. Vine a good grower and productive, but varies very much in different soils, lacking color in a great many, but making a fine sprightly claret in good locations, if well handled. Bunch large and heavy, shouldered; berry round, medium, black, very juicy, but ripening unevenly, and requires to hang long, as it contains a great deal of acid. A blend with a small quantity of Lenoir will improve it greatly, giving it a deeper color and a fuller taste.

VARIETIES PROMISING WELL.

BLACK FARMOT. — Vine vigorous and productive. Bunch small, very compact, shouldered; berry oblong, medium, juicy, with black-purple juice. Not tried for wine.

BLACK DISCHIA.—Syns. Black Pinot, Blane Claevner, Black Merlat, Chauche Noir. A good grower and moderate bearer. Bunch medium, compact, shouldered; berry below medium, oblong, black, of high character, but hardly productive enough, and the wine lacks color.

MATARO.—Syn. Balsac, Upright Burgundy. A good grower, and hardy, also very productive. Bunch heavy, compact; berry medium, black, with blue bloom; makes a fair red wine, but not of first quality nor very deep color.

CHARBONO.—Syn. Charbonneau. Vine very productive and hardy. Bunch long, shouldered, of peculiar shape; berry medium, moderately juicy, but decidedly flat and coarse in taste. Makes a very dark red wine, and plenty of it, but of second quality; only valuable for blending and coloring, for which purpose I think the Lenoir far more valuable, and a much better wine.

CARIGNANE.—Syn. Crignane. Similar to Mataro in productiveness and quality; will also make a good red wine, though hardly first class.

GRENACHE.—Vine very productive; especially adapted to poor soils. Bunch heavy and compact; berry rather small. Makes a fair red wine, but hardly of the highest quality.

MEUNIER.—Syns. Miller's Burgundy. Franc Pinot. Vine a slender grower, fair bearer. Bunch small, compact; berry small, black, juicy. Makes a fine red wine.

FOR WHITE WINE.

CHAUCHE GRIS.—Syns. Gray Riessling, Gray Dischia, Gray Claevner, Gray Pinot, Rulander. Vine a vigorous grower, very productive. Bunch medium, very compact, shouldered; berry small, oblong, of a peculiar gray color, very sprightly, juicy. Makes a very fine white wine, sprightly and high flavored, of the first quality and decided character; valuable by itself, and peculiarly suited to impart character to other white wines.

FRANKEN RIESSLING.—Syns. Sylvaner, Oesterreicher. Vine thrifty and productive. Bunch medium, compact, shouldered; berry rather small, very juicy, high flavored, with an agreeable mingling of acid and sweet. Makes a fine wine of high character, and a good deal of it.

JOHANNISBERG RIESSLING.—Syns. True Riessling, Schloss Johannisberg. This grape and its quality are too well known to need laudation. It makes one of the finest of our wines, and may be called the standard of excellence in white wines. Vine vigorous, moderately productive with long pruning. Bunch small, compact; berry small, greenish-yellow, with a peculiar gray dot on the sunny side.

ORLEANS RIESSLING.—This is somewhat similar to the Franken Riessling, a very heavy bearer and vigorous vine, while many rate its wine higher than that of the Franken. It is a very desirable variety.

KLEINBERGER.—Also a variety of Riessling, valued very highly in Sonoma Valley on account of its general productiveness, vigor, and the uniform good quality of its wine.

SAUVIGNON VERT.—Syns. Green Sauvignon, Chablis. This is the celebrated Sauterne grape of France, and it succeeds admirably here; it is a very heavy bearer, its wine is very pure in taste, yet sprightly, and is one

of our best white-wine grapes. Bunch above medium, long, rather loose; berry rather small, greenish white, very juicy and sprightly.

SEMILLION.—This is another of the famous white-wine grapes of France. Vine vigorous, productive; bunch compact, shouldered; berry full, medium, slightly oblong, very juicy and sprightly.

SEEDLESS SULTANA.—This is perhaps the most profitable of all white-wine grapes, as it is an enormous bearer with long pruning, a vigorous grower; has a very heavy bunch, and ripens evenly. Add to this that it has no seeds, consequently yields a large amount of must, and that it makes an excellent wine of a greenish-white color, and we cannot wonder that it is planted extensively by all who appreciate these qualities. With Mr. R. B. Blowers, of Woodland, who first planted it for raisins, it produced seventeen tons to the acre last year, which, as the unusual rains interfered with curing them for raisins, the wine-makers purchased readily at thirty-two dollars per ton; and Mr. Crabb, who has made wine of it for several years, has this year secured the whole crop of that neighborhood at thirty dollars per ton. Bunch large and heavy, shouldered; berry small, round, golden yellow, without seeds, and with a delicate pure taste and flavor. The wine made from it by Mr. Crabb was one of the best on exhibition among the white wines exhibited at the Grape Growers' Convention, at Dashaway Hall.

TRAMINER.—This is one of the most famous wine grapes of the Palatinate and the Rhine, and has furnished some of the noblest wines made in this State. It is a rather delicate grower, but an abundant bearer. Bunch small, shouldered; berry small, reddish-lilac, sweet, spicy, and high flavored, and rich in sugar. It makes a wine of great body, smooth, rich, and high flavored.

PEDRO XIMENES.—Syn. Chasselas de Foy. The celebrated Sherry grape of Spain, which makes a fine white wine of high character here. Bunch long, loose, not shouldered; berry full, medium, greenish-yellow, juicy, and high flavored, containing a good deal of tannin; ripens rather late.

WEST'S PROLIFIC.—The origin of this grape is unknown; it was first cultivated by Mr. George West, at Stockton. It is an enormous bearer, somewhat resembling the foregoing, but heavier in its bunch; berry somewhat smaller and more delicate. Makes a very fine white wine, and an excellent, delicately-flavored brandy.

To these, which are all of the first quality for white wines, I would add several varieties of Chasselas, on account of their regular productiveness and the uniformly fair quality of their wines, which are very mild and agreeable, though not of the highest character.

CHASSELAS FONTAINEBLEAU.—Syns. Gutedel, Royal Muscadine. This is rather a delicate, straggling grower, but a very uniform and prolific bearer, while its fruit is always even. Bunch medium, shouldered; berry medium, round, golden yellow, with sometimes a brownish tinge in the sun. The "Gutedel" of Messrs. Gundlach & Co. has already established quite a reputation, and is uniformly appreciated as a delicate, pleasant wine.

CHASSELAS VIOLETTE.—Syn. Chasselas Rouge. A stronger grower than the foregoing, with peculiar, brownish foliage, and has also the peculiarity that the young fruit assumes a violet tinge when but half grown, being darker then than when it is fully ripe; very productive. Bunch long, rather loose, shouldered; berry medium, round, pale red or lilac, sweet and good. Makes a rather richer and higher flavored wine than the foregoing.

VICTORIA CHASSELAS.—Syns. Red Chasselas, Queen Victoria, Bakator, Barbaroux. A very estimable grape,

a short-jointed, stocky grower, especially adapted to stool training, and a heavy bearer of very large bunches. Bunch very large, often weighing six pounds, compact, and shouldered; berry medium, round, red, with beautiful lilac bloom, juicy, high flavored, and spicy, making a very good white wine.

To those who admire a Muscatelle flavor, the small German Muscatelle, or Frontignan, will be acceptable, as it is a good bearer of medium-sized bunches, which make a heavy, yet sprightly wine, with a delicate Muscat or Frontignan flavor, which makes it a favorite with many.

VARIETIES PROMISING WELL.

MARSANNE.—A beautiful grower and heavy bearer of fruit which somewhat resembles the Sauvignon Vert, and is of a very high character, promising well for a delicate wine.

CADILLAC.—Good grower and bearer. Bunch long and loose; berry medium, round. Is one of the celebrated wine grapes of France, and the few samples made here seem to sustain its European reputation.

LA FOLLE BLANCHE.—Said to be an enormous bearer, hence its name, "the Crazy." Good wine has been made of it in this State, and in France it is famous for producing the finest flavored and most delicate brandy.

BURGER.—Syns. Berger, Putzscheere. An old variety in this State, an enormous bearer of very heavy bunches, but making a very light, acid wine in the valley lands of the north, while the hillsides afford a better product. In the south, near Los Angeles, very good wine has been made from it by Messrs. Stern and Rose, and others. It seems to be well adapted there; in the north I would plant it only in warm locations and on the hillsides. It is a neutral wine, of very little character, but useful for blending on account of its agreeable acid and smoothness. I do not see any reason why those who can have

the Sultana, which will bear the same quantity and give much better quality, should plant the Burger.

Among the American varieties promising highly for white wine, the Herbemont, or Warren, is perhaps the first. Wine has been made from it here, which is very fine, of a pale straw-color, and fine flavor. The vine grows vigorously, has beautiful foliage, and endures all the vicissitudes of our hot summers. It is the only variety in the vineyards under my charge which has not suffered in the least from the three hot days in June, which caused *coulure* in all others. As it is also fully resistant to phylloxera, it promises to be a valuable acquisition to this State, as it has already become in France, where its wine ranks high. For a full description of it, I refer the reader to the first part of the book.

I will add here, that all the varieties of *Vitis æstivalis* promise well here; they have splendid foliage, which admirably withstands the sun and drouth, and also the attacks of the thrip, to which the more delicate leaves of the varieties of *V. vinifera* succumb. Norton's Virginia, at Fresno, with Mr. Eisen, has splendid foliage, and also bears well with long pruning, and here in our vineyards the Cynthiana, Cunningham, Rulander, and Dunn, are growing finely, though not old enough to bear fruit as yet. The improved varieties of *V. riparia*, however, seem to lose their leaves, and the fruit is smaller than in Missouri; they may not, therefore, be valuable for any other purpose than for grafting stocks. I can report on them further next year, when I shall have a number of varieties in bearing.

In obtaining cuttings or vines, the purchaser should be especially careful to procure them of reliable men. There is such confusion existing here in the nomenclature of vines, that but very few know what they really have, and as a great many vineyards are grievously mixed, it is very difficult indeed to obtain varieties true to name.

It will be a herculean task to bring order out of this chaos, and if our State Viticultural Commission would apply a part of their efforts earnestly to this, they would do the public a greater benefit than by constantly preaching French and other outlandish practices and theories which may prove impracticable here.

The foregoing are but a few of the varieties cultivated here, and no doubt the near future will bring a number of others into notice that may be fully as valuable. Among these the Trousseau promises well for making a valuable, dark-colored wine, especially useful to be manufactured into Port. The varieties just named and described are specially adapted to make fine, dry red and white wines, which, in my opinion, will be the leading interest in grape culture in this State.

The question, whether to plant more red or white-wine grapes, is one that may be difficult to answer. The demand at present seems to be very large for clarets, larger than for white wines. But, on the other hand, the plantings of red-wine grapes, especially of Zinfandel, have been much more numerous than those of choice white varieties. It is certain that there is a class of consumers who prefer choice hocks and white wines to clarets, and they are generally willing to pay a good price. When the general tendency seems to be to plant red-wine grapes, surely some should make white wines to meet the demand for them which already exists, and is sure to increase. Besides, we have a choicer selection of white wines and white-wine grapes than of red, and would make a comparatively better article of them to-day than of red wines. My advice would be to plant what suits your soil. If it is not red, volcanic soil, or adobe, which will give good color, plant mostly red grapes. If the soil is loose, or sandy, plant white-wine grapes. If the wines you make are good, they will sell readily, whether they are red or white.

CHAPTER LI.

CULTIVATION, TRAINING, AND GRAFTING.

During the first summer after planting, the young vines will need no further attention than frequent stirring of the soil by plowing, cultivating, and hoeing. Where they are not irrigated, they will make but slow growth the first summer, as this season is without rain, from the beginning or middle of May until September, and sometimes even longer. Keep the surface of the soil loose and mellow, it is the only way to retain moisture in the soil and keep the plants alive and growing. The vine will become established and firmly rooted the first summer, and its progress will be rapid the second year. Cut back to two buds of the young growth, from which to start a strong shoot to form the basis of the future vine. Plowing is the operation next in order. The common practice has been to commence in the middle of the row, with a good team and a two-horse plow. Plow a good, deep furrow in the centre of the row, then return in the row, plowing the second furrow towards the first, and a third furrow towards the first from the other side, so as throw the soil towards the middle and from the vines. This is as near as you can come to the vines with two horses, and a man with a single horse walking in the furrow finishes up the row close to the vines, always plowing the ground away from the vines, and towards the middle. A good, careful man can come within a few inches of the vine and leave but a small strip for the hoe. Hoeing comes next, and we use either two-pronged hoes, the old German implement, or spading forks, with which the ground is thoroughly loosened and stirred around the vine. Then comes cross-plowing, which is done by plowing across the former furrows at right angles, first throwing a shallow furrow with

a one-horse plow towards the vine, on each side of the row, which is followed by one somewhat deeper, still with a one-horse plow, which is followed by a two-horse plow until the centre of the space is finished. This leaves the vines in a bed of mellow earth around them, and the ground is still more mellowed by harrowing across with an iron harrow, wide enough to take the row pretty close to the vines, to break the lumps and destroy the weeds. The Acme harrow is best for this purpose. Commence with these operations as soon as the ground is dry enough to work well, in spring. If the winter is as favorable as the two last have been, most of these operations can be performed during the winter months, which is also a good time to plant rooted vines, make cuttings, etc. There is a prejudice against planting cuttings in the vineyard during winter, as our old practitioners say that the cuttings will rot in the cool, damp soil, and will not start as freely as if planted in March or April, when the ground is warmer. This sounds plausible, and as I have had mostly rooted vines to plant, which kept me busy all winter, I have not been able to test it practically. I know, however, that the young vines planted in winter start readily early in spring, and it would seem that the same theory would apply to cuttings.

The above is the most common way of plowing in vogue all through this section. Great improvements have been made lately, however, by gang plows, invented for vineyard use. I will describe one of them, invented by a gentleman in Napa Co., this State. It consists of an iron frame on two low wheels, and has a tongue to guide it, as have all gang plows. The iron frame consists of five strong iron bars, running lengthwise, connected by a cross-bar behind. To these bars, which are about a furrow's breadth apart, two plowshares are attached by iron clamps, taking the two centre furrows first, throwing the ground together in the middle. When a piece is thus

finished, the plows are attached to the next two bars, and take the next two furrows. When this is done, the plows are again set out further, either by crooked shanks, bringing them a furrow closer to the vines, or by a square attachment to the frame. I prefer the latter, especially among young vines. Of course, the plows must be one right-hand share and a left-hand one. In loose soil, in our valleys, two horses can pull the machine, but in heavy soil, and on hillsides, it takes four to do good work. The driver rides on the plow, behind the horses, and regulates the depth of the furrow by a lever, like a brake on a wagon, by which he can lift the plow entirely out of the ground when he turns at the end. There should be abundance of room at the ends of the rows, to turn without damaging the vines.

In cross-plowing, the shares are reversed on the frame, so as to throw the ground to the vines, and the furrows next to the vines are taken first. After the first two plowings, it can also be converted, in tough, consistent soils, into a cultivator, by attaching four shares and not plowing so deep. It saves a great deal of labor, as it does double the work of a common two-horse plow, needs but one driver, and does the work better.

Several similar plows have since been invented, which claim to do better and more work; but, so far as I know, none have been fully completed. They will plow about seven acres a day, with two shares attached, and we have cultivated an average of seventeen acres a day with one man and four horses when four shares were used.

Cultivation during the summer is generally done with sulky cultivators, with five teeth, to make the ground loose and mellow and keep down the weeds, using common field hoes around the vines as often as necessary. As the system of planting and training admits of cultivating in both directions, it makes it very easy to keep the ground clean and mellow, especially as the dry weather

stops the growth of weeds. The vines do not materially need a support the second summer, especially if they are of varieties of stock resistant to phylloxera, to be grafted next spring. They may be allowed to trail on the ground, and as cultivation is generally finished by the first of August, they will not interfere much with it.

The third summer we expect to train our vines and give them the first start of a head or top. If the young vine is a Vinifera, or other variety, which is to be a direct producer, and has made a stocky growth of three feet, it is pruned to one cane of eighteen inches or two feet, as may suit the habits of the vine and the fancy of the cultivator. A stake of red-wood should then be provided for support, the usual length is four feet, by an inch and a half in diameter, though many prefer stakes five and even six feet long. A four-foot stake will give from two feet six inches to two feet nine inches above ground, which is high enough for most varieties if the head is formed at eighteen inches above the ground. These stakes can either be purchased in bolts, at about twelve dollars per cord, and split by the vintner, or they can be had sawed, at seventeen dollars per thousand. If long stakes are used, they should also be thicker, and will cost more in proportion. In many vineyards they dispense with stakes altogether, but I think this is very slovenly culture, and not to be recommended. A vine, if worth anything at all, is worth a stake; it is more convenient in cultivating, gives a support to the vine which is very much needed, and will pay the additional cost in less than two years by the increased yield and better quality of the fruit. The stakes are pointed at one end and driven, by a mallet or sledge, on the south west side of the vine, as our prevailing winds are from that side, and by tieing to that side the vine is also shaded from the afternoon sun. The tieing is done either with willow twigs, of which every vintner should

raise a supply, and which make the best and most durable tie, or with grape twine. The New Zealand Flax (*Phormium tenax*), makes an excellent tie, and can be grown for that purpose in swampy places. The Agricultural Department of the State University has sent out quite a number of the plants, and its leaves, torn into strips, make a very strong and flexible material for tieing.

GRAFTING THE VINES.

If resistant stocks were planted, they will be strong enough for grafting now. This operation may be commenced here in February, and carried on into May, provided the cions are kept dormant and in good condition. The common cleft graft, as illustrated in the first part of this book, on page 23, I still consider the simplest, best, and most successful. To do it most conveniently and quickly, however, I think it needs a force of five men, each to do his own particular share of the work. It can best be done after the first hoeing, when the ground can be taken away from the collar of the vine, leaving it ready for the operation. One man now cuts the stocks with sharp pruning shears (page 119), keeping the blade of the shears on the upper side, and cutting square across. The cut should be made at a smooth place, about an inch and a half above a knot or joint, and either at the surface of the ground or just below it. Then make a longitudinal cut in the stock, also with the shears, cutting straight downwards, and also with the blade of the shears kept on top, so as not to bruise the bark. Let another man cut the cions, as figured on page 23, making a long, sloping, smooth wedge, thinner on one side than on the other. Hand No. 3 then inserts the cions, which he can do in stocks of that size without a wedge or any other implement, pushing the cion down

so that it fits nicely the inner bark of the cion to the inner bark of the stock, and on the upper side of the latter. Hand No. 4 follows with tying material; basswood bark or rice straw are very suitable, if kept moist. Hand No. 5 follows with a hoe, and pulls fine, pulverized earth around the junction, up to the top of the cion, to keep off the sun and hold the moisture. It will be well to drive a stake on the southwest side of the vine immediately after grafting, say two to three inches from it, to which the young shoots, when they appear, can be tied from time to time during the summer; it will also serve to shade and protect the graft. If suckers of the wild stock appear, they should be rubbed off, taking care not to disturb the cion, and in hoeing and plowing afterwards, the same care should be exercised. After-cultivation is the same as with the other vines. If the graft grows vigorously, it may be pinched when eighteen inches high; this will serve to start the laterals, from which the head of the vine may be formed the next spring, and also to make the vine more stocky and ripen the lower buds.

In this manner, by dividing the labor, grafting will be performed quicker and better; as each man handles but one tool, and as each of the operations is very simple indeed, he will soon learn to do his part well, if he has but ordinary intelligence and dexterity. I am sure that five men, thus organized, can easily graft five thousand vines per day, or one thousand each. Of course, care should be taken that the cions are not exposed. They can be carried in a tin can or pail, with the wedge downwards, in moist saw-dust. If everything is done well, ninety per cent. will grow, and the few which fail may be grafted again next season. If any of the stocks are too small, leave them until next season. They should be at least two-thirds of an inch in diameter to graft well, while an inch to an inch and a quarter is a still better size.

There are a great many other methods, such as the so-

called English cleft, or whip graft, saddle grafting, grafting by approach, etc. It is not my object to give an elaborate treatise upon grafting, but to give the most simple and practical method by which large vineyards can be grafted with the least labor and cost, as well as with the greatest assurance of success, and for which common field hands, with ordinary intelligence and skill, can be used. All the more complicated methods, as well as grafting in the shop and setting out the grafts, I consider as little better than impractical nuisances, not adapted to the requirements of the practical vineyardist.

With this method little or no time will be lost, for we do not expect much fruit the third summer, and the graft will make nearly, if not quite, as much growth as a shoot from the original vine would have done.

Vines which were not grafted, but tied to the stake and pruned as described, will push out strong shoots from the upper buds. These are left, either two or three, to form the future head of the vine. If the growth is strong, each of these shoots will bear a few bunches of grapes, so that the crop, the third summer, will sometimes be from one to two tons of grapes to the acre, enough to pay for staking and cultivation. In the southern part of the State, where vineyards are irrigated, there are instances on record of two to three tons of grapes even the second summer; but here in the north, where we do not irrigate, it generally takes four years before much of a crop can be obtained, nor is it judicious to let the vines bear too early, as it exhausts and debilitates them. To form a good head, all the lower shoots should be rubbed off as soon as they appear, and only two or three of the upper shoots be left, according to the strength of the vine.

The following winter, if the stool or head pruning, which is now most generally followed, is to be adopted, we usually cut back these shoots to two or three buds

each, always pruning to an outward bud, so that the upper shoot, which will be the strongest, will grow outward, as the object is to train the vine in the shape of a hollow shrub, with as much light and air in the centre as possible. This mode of training has been the universal one, and seems to be specially adapted to the Mission vine and some other varieties: Zinfandel, Victoria, Chasselas, Malvaisia, and other short, stocky growers, all produce well with it, and it is certainly very convenient and easy. If our vine has three shoots, or branches, and is pruned to three spurs of two buds each, these will give us six shoots, enough to form the future head. In June, in this part of the State, the young shoots are generally twelve to eighteen inches long. The vine is then suckered, as it is commonly called, which consists in rubbing off all barren and weak shoots, all that may appear from the bottom and the stem of the vine, and also all shoots that show a tendency to crowd the head. This is also a good time to pinch the tips of the remaining shoots, to make them more stocky and shade the fruit better, as they will then throw out lateral branches. I know that many consider this latter operation superfluous, and even injurious, but I have found it very advantageous, especially as a guard against our heavy winds, which have more power on the long and straggling unchecked shoots, the vine balances much better, and the fruit is less exposed to sun-scald. It is different in its effects from the cutting of the ripening wood in August, which is absolutely injurious, checking the growth, and robbing the vine of its leaves when they are most needed to perfect and ripen the crop. For all the Riessling varieties, the Chasselas Fontainebleau, Violet Chasselas, Seedless Sultana, and all those which make longer growth of cane, especially the varieties of *V. æstivalis*, I think a different mode of training should be followed, and the general experience of grape growers

points that way. With those I would form the head from twelve to eighteen inches from the ground the third summer. In next winter's pruning, if they have made three strong shoots, cut back each of them to three buds, from which we can expect at least six strong, healthy shoots. In pruning, the fourth winter, cut the three strongest of these, one from each branch of the vine, back to a short cane, say eighteen inches, and the others to spurs of two buds each. These canes are tied over to the stake with a strong band of willow, and will bear more and better fruit than if cut back to short spurs. At the next pruning these old arms may be left, if they are healthy and sound, and the strongest of their branches be cut back to spurs of two buds, while the weak shoots are taken out altogether, or, if they are deficient, they may be cut out and a new cane from the lower spurs tied in their place. This method of training allows cultivation both ways, and has been so successful wherever tried, that the use of stakes becomes more general everywhere. I have more than doubled the product of an old piece of Chasselas and Muscatelle, which had been trained to low heads without stakes, by training them in this way, and also improved the quality, as under the former treatment the long canes were blown over by the wind, and the fruit exposed to the sun.

In stool training the vines are cut back again to spurs the next winter, cutting back to the strongest shoots, and taking out the weaker ones. Of course in this, as in all systems of pruning, due attention must be paid to the strength of the vine, and the spurs may vary from four to twelve, or even sixteen, according to its vigor.

Cultivation is essentially the same as in the first years, only, as the vines become stronger and more branched, especially after pruning, great care must be taken not to break and tear the vines in plowing. Here, again,

the gang plows are of great advantage, as the plows can be so arranged as to run close to the vines without breaking the spurs or stakes.

DISEASES AND INSECTS.

Of diseases we do not suffer very much here, although mildew (*Oidium*), black knot, red leaf—also called Spanish Measles, which is the same disease, I think, called Anthracnose in France, and "Pocken des Weinstocks" in Germany, and Coulure, or imperfect setting of the young fruit, prevail to a certain extent. The best remedy against mildew is pulverized sulphur, dusted on the vines through a dredge with a fine wire screen. It is generally applied twice in the season, in June and July, on calm mornings, when a good, active hand can sulphur about five acres in half a day. About two pounds to the acre is sufficient, and as it also is a good fertilizer, it will pay to apply it abundantly, though not too late in the season, as it will impart its taste to the wine.

Black Knot, also called Grape Cancer by some, is a black, warty excrescence, which appears on the stems of the vine and also on its branches. Its main causes are stagnation of sap, caused by external injuries, excessive pruning, or frost. Vineyards judiciously pruned, and not subject to frost, will suffer but little from this disease. With me it has almost entirely disappeared, though it was formerly very frequent, when strong vines, with a good growth of cane fifteen feet long, were barbarously cut back to five spurs of two buds each every year. Any one who prunes his vines so unreasonably, should be punished by having the Black Knot to teach him better sense.

Where the young growth of a vineyard has been entirely killed by a sudden frost when it was in an immature state, so that the vine has no outlet for its flow of

sap, they may sometimes be saved by grafting, when the cion will take up what would otherwise stagnate. But if the reader will take my advice, he will not plant a vineyard in a frosty location, as "an ounce of prevention is better than a pound of cure."

"Coulure," or imperfect setting of the fruit, follows sudden changes in the weather, and has done much damage this year, when cold, damp, foggy weather was followed by hot days, when a hot wind blew from the north for nearly three days and nights, early in June; the vines, which were in bloom at that time, did not set more than half a crop, while those which bloomed later suffered comparatively but little damage. Some varieties, such as the Malbec, and others of that class, seem to suffer almost constantly from it, and the best preventive is, not to plant such kinds. I know of no remedy which could be applied, and fortunately it is of rare occurrence here.

Red Leaf, or Spanish Measles. This will prove identical, I think, with the disease the French call *Anthracnose*. It generally appears in midsummer, when the fruit is but half grown. The leaves of the vine show red spots, finally become red altogether, and drop off. The young fruit becomes discolored, first grayish, then shrivels up, and turns black. Very often only a certain branch of the vine is affected, while all the others are healthy; a vine may have it one summer and be entirely free from it the next. It is most destructive on the Mission grape, although it attacks all varieties more or less. It has never been very destructive as yet. An application of sulphate of iron in solution is recommended as a remedy, applied in spring; some also recommend sulphur, but I can see no benefit from the latter.

Among the insects injurious to the vine, found in this State, the most formidable certainly is the phylloxera, and it has already made serious inroads upon this in-

dustry in various sections of the State, though not spreading with the same rapidity, or being so immediately fatal as it is in France. It has made its appearance in so many sections of the State, that we may take it for granted that it will appear everywhere in time, although it may never gain a firm foothold in those districts where the soil is very sandy, and it can be submerged. That its inroads can be serious enough even here, can easily be seen in the devastated vineyards of Sonoma and Napa counties, where hundreds of acres of once flourishing vines have already succumbed to it. While it is undoubtedly true that vines in exhausted soil, impoverished by constant crops, yield to its attacks quicker than those on richer soil, or fertilized with manures, there can be no doubt that all Vinifera varieties will succumb to it in time, even in the richest soil. It is also just as apparent that resistant vines, planted in soils where the Vinifera varieties have been entirely destroyed, and the ground is full of the insects, will live, thrive, and produce abundantly. The best and only safe course for the planter is, therefore, to plant resistant vines; and I would consider it the hight of folly for any one to plant Viniferas in an infected district. Let them not rely on insecticides as a partial remedy. It is much cheaper, indeed, to plant resistant vines at once, and be on the safe side, than to doctor a vineyard where the insect has once appeared. The plantings of Messrs. Dresel and Gundlach, in Sonoma Valley, as well as my own, of over two hundred and eighty acres of resistant vines, have fully demonstrated the fact that the *riparia* and its varieties will thrive in all soils, and grow even more vigorously than the *vinifera*, wherever it will succeed. My course would therefore be to plant *riparia* and *rupestris*, which will grow easily from cuttings, and graft them as described in the preceding pages. I am glad to see that the last Convention of Grape Growers, at San Francisco, took a de-

cided stand at last in favor of resistant vines as the only means of entire safety, a conclusion at which the best French authorities have arrived long ago. The testimony of such men as Professor Gustave Foex, M. A. Millardet, Professor Riley, and other authorities without number, ought certainly to be conclusive evidence in the case; but the report of three French experts, which I give here in full, establishes a new phase of the question, namely, that the French varieties, when grafted on American stocks, produce much more abundantly than they ever did on their own roots.

CHAPTER LII.

AMERICAN VINES IN FRANCE.

The following extract, from "The Wine and Spirit News," contains about the latest French experience on the subject of American vines, and is conclusive enough to convince the most skeptical. It clearly establishes two points: 1st, The entire resistance of the American vines to phylloxera; 2nd, The adaptability of the Vinifera for grafting on the American stock, as it positively states that the productiveness of the European varieties has been increased by one-half over the original yield :

"Under the heading 'Measures for Combating the Phylloxera,' a pamphlet has recently been published at Bordeaux, giving an account of a visit paid by M. A. Lalande, the deputy for the Gironde, in company with M.M. Ed. Lawton and T. and P. Skawinski, to the districts of the Herault and the Gard, for the purpose of studying the means employed in those departments with a view to the destruction of the phylloxera or, where necessary, reconstituting the vineyards already destroyed.

REESE LIBRARY OF THE UNIVERSITY CALIFORNIA

This journey, which extended over six days, was undertaken more especially in the interests of the vine-growers of the great and important district of the Medoc, the centre of the richest vine districts of France.

"Up to the present time, the ravages of the phylloxera, although considerable, have not by any means been so serious in the Medoc as in some of the other wine-producing districts of France. In the department of the Gard, for instance, it is stated that out of two hundred and fifty-five thousand acres of vines, two hundred and fifty thousand have been destroyed; while in the Herault, which produced at one time three hundred and thirty million gallons of wine, and the average annual production of which was two hundred and twenty million gallons, the quantity for 1881 fell to seventy-seven million gallons only. From these figures it will readily be seen that the field for inquiry offered by these two departments was an extensive one, and the information to be obtained should be of extreme value as a guide to other districts, and all the more so, as energetic measures have already been adopted by the vine-growers of the South, with a view, if not to save, at least to renew the vines which constitute for them the chief wealth of their districts.

"Before proceeding further, we may say that the information and evidence obtained by M. Lalande and his fellow-travellers throws a somewhat new light upon the question of the phylloxera, and seems to show that, serious as the damage caused by this insect has been, and still continues to be, the case is not altogether a hopeless one. Of various remedies, some thousands in number, suggested for combating the phylloxera, three only at the present time hold an important position. The credit of having suggested one of these, that of re-planting by the American vines, is assigned to M. Laliman, and that gentleman shares with Baron Thenard, M. Dumas, and

M. Fancon, the honor of having indicated to the French vine-growers the three means capable, according to situation and other circumstances, of resisting the terrible plague which at one time threatened to annihilate the vineyards of France—that is to say, the employment of insecticides, submersion, and American vines.

"Of the first remedy we hear but few particulars during the journey undertaken by M. Lalande; of the second no notice is taken at all; while, on the other hand, of the results obtained by means of the third, most striking evidence is given, and, indeed, it is apparent that it is to the last remedy—that of re-planting with American vines—that M. Lalande and his fellow-travelers attach the greatest importance.

"On the first day of their excursion the chief interest seems to have been attracted to some vineyards in the neighborhood of Beziers, where an extent of more than five thousand acres of vines had been preserved for some years past by means of sulphide of carbon, accompanied each year by manuring over about a third of the extent of the lands in question. As a result of this treatment, it is stated that the vegetation was good and normal, although there were some points where the sulphide of carbon appeared not to have acted with the same efficiency and success as elsewhere. The failure in these cases, however, was attributed to the extreme humidity, which had paralyzed the action of the sulphide, a failure which, it is hoped, may be remedied in future by means of drainage.

"Proceeding on the second day to the neighborhood of Montpelier, a visit was there paid to an estate on which all the French vines had been destroyed some time previously, and which now presented the interesting appearance of an entire reconstitution of the vineyard on a grand scale by means of American vines planted ten years previously, and subsequently grafted with the French

vines, which latter have since offered a perfect resistance to the attacks of the phylloxera.

"In the same district another property was found where the vines, which were of a French variety, had been grafted either on the Lenoir, Clinton, Taylor, or Riparia, and were in a splendid state of vegetation, with an abundant appearance of fruit.

"Similar accounts are given as to a number of other properties visited on this and the succeeding days, as to which M. Lalande remarks: 'It does not appear necessary to give a detailed account of all we have been able to observe. We limit ourselves, therefore, to remarking that, after having seen numerous specimens of all varieties of American vines introduced into France, we have especially noticed some Lenoir and Herbemont vines as presenting a magnificent appearance, with a fair quantity of fruit, although, it should be stated, much less so than was to be found where French vines had been grafted on American stocks.' As a proof of this fact, some particulars are given of a property in the neighborhood of Montpelier, where all the French vines had been destroyed by the phylloxera. Here some two hundred acres had been replanted a few years previously with the American vine called Riparia, and these had been subsequently grafted with French vines. The results in this case were splendid, the vegetation being very fine, and the quantity of fruit enormous, in fact, all the vines were loaded with magnificent grapes, and these extremely well formed, so much so that the production had increased by half as much again per acre on the original yield.

"Very much the same results were observed on the last day of the journey, when visiting the extensive vineyards of the Duchess Fitz James. This lady has given much attention to the question of the advantages to be derived from replanting with American vines, and an article con-

tributed by her some twelve months ago to the *Revue des deux Mondes*, on the subject of American vines, may be said to have contained, at that time, all the information to be obtained in regard to the same. Speaking of this property, M. Lalande says: 'We have much admired here the American vines—principally the Lenoir—cultivated with a view to direct production, as also the American vines grafted with French varieties. We have, however, still more admired, if this were possible, the energy and intelligence displayed by the Duchess Fitz James in the reconstitution of her vineyards. Some idea may be formed of this when we state that she has already successfully replanted one thousand two hundred and seventy-five acres of vines, and is making arrangements for increasing this replanting to the extent of nearly two thousand acres, thereby inspiring the conviction that the magnificent vineyards of this district—now almost entirely destroyed—will be able gradually to be reconstituted by means of American vines.'

"One other curious piece of information resulted from this visit. It appears that, it having been found that vines planted in sandy soils resisted the attacks of phylloxera better, these lands, which formerly had been neglected, and were worth scarcely thirty-two shillings per acre, have now, after they have been planted with vines, increased in value to nearly one hundred times that amount. Thus in the sandy soil of Aigues-Mortes, the American vines which have been planted there presented a magnificent appearance with an abundant show of fruit.

"From all the information obtained during their visit, M. Lalande and his fellow-travellers state as the result of their experience, they found in the departments of the Herault and the Gard, that the preference was given by the vine-growers, almost exclusively, to two kinds of American vines—the Lenoir and the Riparia, although some other varieties, such as the Clinton, the Solonis,

the York-Madeira, and the Rupestris, are considered excellent importations for grafting with French vines.

"Too much praise cannot be bestowed upon M. Lalande and those associated with him in this journey, undertaken as it was, entirely in the interests of the French vine-growers, and if, as appears more than likely, as the result of their visit, the practice should become general throughout France of replanting with American vines as a means of resisting the phylloxera, the destruction of the French vineyards, which at one time appeared more than possible, may, it now seems more than probable, be averted."

CHAPTER LIII.

RESTORING AN INFESTED VINEYARD.—FROSTS.

But the question may well be asked: "What shall we do with an old vineyard, infested by the insect?"—I have the management of such a vineyard of about seventy-five acres, of which about twenty-five have already succumbed, and I have no faith in the application of any of the insecticides that have been tried, believing that the remedy will not be lasting, and will cost more than it is worth. But I believe in the liberal application of manures. This whole vineyard, the crop of which had already dwindled down to twenty thousand gallons in 1882, when I took it in hand, was well manured the next winter. A part of it was treated with stable manure, a part with gas lime, and another portion with ammoniacal liquid from the gas works. I diluted the latter by adding seventy gallons of water to ten gallons of the liquid, and applied about half a gallon of the solution to each vine, making a shallow trench about a foot from the stem. The gas lime I scattered thinly over the surface of the soil, using at the rate of half a gallon to each square of eight feet.

The stable manure was also distributed over the surface and plowed under. The ammoniacal liquid was again applied in midsummer, and showed astonishing results in the increased vigor of the vines and size of the berries. The gas lime was next in efficacy, and the stable manure third, but all caused an increased vigor, and though we lost over five acres again by the insect, we made thirty-seven thousand gallons of wine, which, deducting the area destroyed, made our crop double that of the year before. It is but fair to say, however, that different pruning and training, as well as better cultivation, contributed largely to this increase. I intend to follow up this treatment, and keep the vines alive as long as I can, and to replant the destroyed part of the vineyard with American vines. Those already set out show satisfactory growth and vigor, although planted in the same place where the Viniferas were destroyed.

In the first part of the book I have already given the condensed life history of the Phylloxera, and it would lead too far, were I to go into all the testimony and details relating to this pest. A word to the wise is sufficient.

We also have the grape vine Fidia here in this State. In addition to the remedies given on page 112; we apply sulphur, which seems to check them. The Thrip or Leaf-hopper (a dull white and yellow insect) is very abundant and destructive to the foliage in certain parts of the State. Spraying in spring with a mixture of sulphur, Buohach and soft soap, through a fine nozzle manufactured for the purpose, is a good remedy. In fall, when the grapes are off, sheep may be turned among the vines, which will eat the leaves and weeds, thereby destroying millions of the insects, and enrich the ground by their droppings.

None of the diseases and insects found here, are such serious obstacles to grape culture, as the unfavorable climate and the manifold diseases present to the grape growers of the States east of the Rocky Mountains. In

fact, the ease with which grapes and all other fruits have been grown here, has engendered in many of the old grape growers, a disposition to ease and slovenliness; and has been the cause of a great deal of poor management and carelessness, of which poor results, in quality and quantity, were the natural consequences. Many have rushed heedlessly into grape culture, without any fitness for the task. These will quit it after a few years of seemingly unfavorable results, and the sooner they drop from the ranks, the better it will be for the ultimate success of the cause.

FROSTS.

As remarked before, the greatest care should be taken to avoid frosty locations. But if any one is so unfortunate as to have a vineyard subject to frosts, he can do something to avoid the calamity. It is a universal practice to place pans holding gas tar in different parts of the vineyard, which is lighted about three o'clock in the morning, and makes a very dense smoke. Any other material that will make a thick smoke, may also be used. While smoke may be a partial protection if the thermometer falls but a degree or so below the freezing point, I have little faith in its efficacy when the temperature falls still lower. I believe more in longer pruning, as a means to guard against total loss. A grape grower in Sonoma valley, who has a very frosty situation, obtained a fair crop in 1882, when neighbouring vineyards were badly damaged, by pruning his vines late in May, when all danger of frost had passed. The upper buds of the vines, which had started before the frost, had all been killed, while the lower ones remained dormant. When he pruned back to these, they started, and produced a fair crop, but as the grapes were very late, they did not ripen fully, and being Zinfandel, made a very acid wine, hardly salable. He

has followed the same course this season, and will have a late and imperfect crop again, when his neighbors, who pruned at the usual time, have a fine and abundant crop.

I think that a crop may be secured in such locations by somewhat longer pruning, leaving spurs of three to four buds, instead of two buds, then the two upper buds will start first, the lower ones of course remaining dormant. If there is no frost, so much the better, the first shoots will then ripen their fruit, and any superfluous shoots may be rubbed out when all danger is past. If a frost should take the first shoots, then the lower, dormant buds will push, and certainly produce earlier and better fruit, than they will do if the vine is first weakened by losing all its leaves and shoots at a time when they are needed for elaborating the sap, and when excessive flow of sap and bleeding are inevitable. This seems to me a simple and natural preventive of total loss by frost, and I advise my readers to try it, hoping that it will prevent this unpleasant calamity.

MARKETING GRAPES.

This is a very important business in this State, and many who follow it find it more profitable than making wine. Carloads upon carloads are shipped East, until California grapes can be found in every market of consequence. The varieties used for shipping are mostly such as have a large handsome berry and bunch, and meaty or solid flesh, with rather thick skin, so that they will carry well. The most popular varieties are the Flame Tokay and Muscat of Alexandria, the first a large lilac berry and a very heavy, compact bunch, sometimes weighing seven to nine pounds, the latter a large greenish-white berry, long, loose bunch, with a strong Muscat flavor. This is also the principal raisin grape. The Rose of Peru, also called Black Prince, is shipped considerably, though it does not bear carriage so well. The earliest grapes shipped are, generally, the

Golden Chasselas and Sweetwater. The Emperor, a late grape of handsome purple color, and Black Morocco, with the Cornuchon, are also shipped to some extent. I hear of contracts made for whole vineyards of these varieties, at from sixty to sixty-five dollars per ton, the buyer paying freight. They are generally packed in boxes of twenty-five pounds each, and the same directions for packing given in the first part of this volume will apply here.

CHAPTER LIV.

RAISIN MAKING.

The making of raisins is a business assuming vast proportions, and California raisins seem to find a ready sale at remunerative prices, when well handled and cured. Many engage in this branch of grape culture, who have concientious scruples against making wine, and even ladies have resorted to it as a pleasant and profitable means of support. Miss M. F. Austin, a maiden lady, is manager of the Hedgerow vineyard, near Fresno, and cultivates thirty acres of grapes for making raisins. Messrs. Briggs Bros. have several hundred acres near Davisville and Woodland, Yolo Co., exclusively in raisin grapes, mostly in Muscats, Muscatella and Gordo Blanco. The Muscats are vines of very peculiar growth, branching close to or from the ground, and have very stocky, short-jointed wood, and they are generally grown very low, most of the branches resting on the ground. The seedless grapes, of which the Sultana is the most prominent and promising, require long pruning to produce well. The White Corinth, smaller than the Sultana, has been grown in this State with varying success; the general impression being that it is not sufficiently productive. Very fine samples of the dried fruit and the grapes of both this and the Sultana were shown at the last Viticultural Convention, and

as the Sultana is also an excellent wine grape, there can be no risk in planting it largely.

As I am not experienced in raisin making, I insert here an article by Mr. R. B. Blowers, from the Report of the State Board of Viticulture for 1880. Mr. B. has made raisin making a speciality in Yolo Co. and has been very successful. He has himself constructed a very practical dryer in which he finishes up the drying begun in the field. The working is described in a very practical manner.

The following is the Report of Mr. R. B. Blowers, Commissioner for the Sacramento District:

"Raisin making being one of the important interests in this viticulturual district, I will explain the California method. Raisins are made from the Muscatella, Gordo Blanco, and Muscat of Alexandria, preferably of the former; also a seedless raisin, highly esteemed, made from the seedless Sultana. The grapes should be allowed to remain on the vine until quite ripe, and show a yellowish or golden color, and being more translucent than when too green. Then they should be carefully picked and placed upon a drying tray (usually two by three feet in size), and exposed, with an inclination toward the sun, in some convenient place, generally between the rows in the vineyard, or in some contiguous open land. After having been exposed a sufficient time to become about half dried, they are turned once in this manner, viz.: two workmen taking an empty tray, place it upon a full one, holding them firmly together, and with a swinging motion turn them over, and replace the now turned grapes in their former position. The turning should be done before the dew is quite off of the grapes in early morning; then, when the grapes have become so dry as to lose their ashy appearance, some being a little too green and some quite dry enough, they are, after removing those entirely too green, slid from the tray into large sweat boxes, having a thick sheet of paper between about every twenty-five or

REESE LIBRARY
UNIVERSITY OF
CALIFORNIA

thirty pounds of raisins, and then removed to the store-room, where they should remain two weeks or more. When ready to pack, it will be found that the too moist ones have parted with their surplus moisture, which has been absorbed by the stems and drier raisins. The stems are now tough and the raisins soft and ready to pack. They are carefully placed in packing frames made of iron or steel. The large and fair ones being placed carefully in the bottom of the frames, the surplus stems and imperfect berries cut away, then the average raisins are arranged in and weighed, placing five pounds in each frame, pressed enough to make them firm in the frame, but not enough to break the skin. They are then passed to an inspector, who examines the exposed side of the raisins, removing any imperfect ones, then placing the wrapper paper on the frame, holds it in place with a wooden or steel plate, turns it bottom up, drops the left end into the box, slides the plate quickly from under the frame, and it drops into the box, then pressing slightly upon the movable bottom of the frame, the frame is removed; the bottom of the frame is then pressed more firmly, to cause the raisins to fill the space formerly occupied by the sides and ends of the frame; then it is removed, and the face of the latter is exposed, all imperfect berries or too wet ones are removed, and all vacancies or hollows filled by large, loose raisins. The label of the proprietor is then placed on the face; the ends of the wrapper, and then the sides are folded over, the box cover nailed on, and they are ready for market.

"The complaint is sometimes made that the California raisins have tough skins, too large and too many seeds, lose flavor in cooking, lose their bloom, and do not keep well. The most of these objections arise from an imperfect knowledge of the best varieties from which to make raisins. If Californians would confine themselves to varieties which centuries of experience have proved to be best

in Europe, there would be more satisfaction in the result. Cultivation, irrigation, local climate, kind of soil, and exposure to sun, all have an influence in modifying the characteristics of any one variety. Virgin soil and vigor of vine may make the seeds fuller, as it does in the cereals, but it should not, other things being equal, make the skins thicker, but the contrary.

"As a soil for raisins, a rich, sandy loam is preferred; the climate should be warm; the soil moist; winter irrigation in average years is quite as important as summer in our dry valleys. For safety against many kinds of insect pests, the phylloxera especially, a location is desirable where water is plenty and evenness of land surface permits winter submersion. In such favorable locations a larger berry, thinner skin, better yield, etc., will be the result. The vines are planted eight by eight feet in many locations, but growers of the greatest experience prefer a greater distance apart; some plant eight feet by ten feet, some ten by ten feet, thus giving greater vigor to each vine, enabling it to resist enemies of all kinds more surely.

"Many hundred tons of shipping grapes are sent East from this district to all principal markets in the United States. The Emperor, Tokay, Black Morocco, and Muscat family are most liked for the Eastern market.

"Irrigation is a very important factor in the success of the fruit grower, but if the situation is good in other respects, and no ditch water can be secured, it is found that in many parts of the State an unfailing supply lies but a small way beneath the surface in gravel ridges. Former watercourses having been filled with gravel, the surface stream diverted sometimes many miles away, leave quite a large flow of water in the gravel. This being tapped by a well, the only equipment needed is a straw-burner engine and rotary pump, and one hundred or more acres can be irrigated with economy, insuring a good profit and a pleasant home.

"In an experiment made recently in Yolo County, after having submerged the entire vineyard for nearly two weeks, such a well being on the place, the ditch water was shut off from twenty acres of the vineyard, and while the water still covered the entire surface to the extent of over nineteen acres, the pump was run five hours, supplying the seepage and raising the water five-eighths of an inch over the entire surface, showing that in twenty-four hours three inches in excess of the seepage could be added to nineteen acres after the ground had been saturated.

"Cost of planting and cultivating, irrigating, labor, subsistence, etc., including total expense for first year, is from twenty to twenty-five dollars per acre, if thoroughly well done; second year, fifteen to twenty dollars; third year, many varieties, if well cared for, yield a profit; if not well attended to it may take a year or two longer. Nothing pays better than care, and nothing loses more surely than negligence in vine growing. In pruning, the habit of each variety grown should be closely studied. In grafting great care should be taken to choose stock with wood of similar growth; if the variety desired is a coarse wood and large grower, a similar stock should be selected; if wood is of fine texture and slow growth, a wood of fine texture should be selected as grafting stock. As fruit growing is destined to be the pursuit of a large portion of the agriculturists of this State, and their experience shows a yearly increase of insect pests, doing great damage to the various branches of the industry, a State entomologist, whose duty should be to study the habits of all injurious insects and assist in devising means for their extermination, seems to be an actual necessity; also, the enactment of some law compelling those careless of their own interests to keep their fruit farms from breeding insects for the contagion of surrounding districts."

CHAPTER LV.

WINE MAKING IN CALIFORNIA.

Wine making is much more simple and less laborious here than in Missouri and the Eastern States, as our dry summers always mature the grapes sufficiently to make a good, salable wine, if well handled in fermenting. The practices of Gall and Petiot are neither useful, necessary, nor profitable here, where grape-juice, if proper varieties are selected, is perfect enough to make a good wine, and is cheaper than additions of sugar and water. In my practice here, during two vintages, very dissimilar in their product, I have not found the least difficulty in making a good, sound wine from every grape I have handled; my wines were always fully through fermentation in less than six days, and clear enough to be marketed in six weeks from the time they were made. They were shipped as far East as Connecticut, when not more than a year old, and arrived in perfect condition.

Let it be understood, therefore, that all the practices given in the following pages relate only to pure grape-juice, and the wine made from it. I am indeed glad that I am making wine in a State where all these manipulations, necessary as they are in a less favorable climate, are entirely superfluous.

The directions about the construction of cellars and fermenting rooms, as given in Part 3 of the book, will also, for the most part, apply here, although it is not necessary, in this temperate climate, to have the fermenting room under ground. On this place we have a three-story wine-house, with a capacity of sixty thousand gallons, which admirably answers all purposes. It is built of stone, forty by sixty feet; the lower story is mostly under ground, and twelve feet high, not arched, but with a double floor, which is supported by a double

row of strong wooden pillars twelve feet from the wall. This gives room for four rows of one thousand gallon casks, one on each side and two in the middle, with sufficient room between for pumping and racking. We have here two rows of six casks on each side, one row of five casks across at the further end, and two rows of five casks each in the middle, making a capacity of twenty-seven thousand gallons, to which we can easily add five thousand more by putting smaller casks on top. This keeps an even temperature of about sixty degrees, summer and winter. The second story is entirely above ground, ten feet high, and with the same capacity as the lower. This is used as the fermenting room proper, and contains two rows of casks of one thousand gallons capacity each, in the middle, with smaller casks and fermenting tanks on each side. The third story is really only a half story, and contains stemmers, crushers, and presses. The grapes are handed up in boxes over a platform at the back end of the building, which is built into the east side of a hill. The upper story contains also some fermenting vats for white grapes, grape boxes, and other implements used in wine-making, and it serves as a shop in which to make cuttings, etc., in winter. The presses are connected by hose through holes in the floor (which is also supported in a similar manner as the lower one) with the casks and fermenting vats below, so that any of the casks on the second or first floor can be filled directly from the press.

The process I have followed here has been, to ferment the true white-wine grapes, such as Chasselas Fontainebleau and Violet, Victoria Chasselas, Muscatell, etc., when stemmed and crushed, for about twenty-four hours on the skins, then press them, and run the juice into casks in the second story, where it finishes fermentation. The average temperature there is about sixty-five to seventy-five degrees.

When I make white wine from Mission and Malvasia, as I have had to do here, as these have a good deal of color in the skins, I stem and crush the grapes, and then press immediately, but very lightly. This juice is run from the press into the thousand-gallon casks on the second floor, and finishes its fermentation there; this is generally over in less than a week. The remainder of the grapes is then thrown into the fermenting vats, also on the second floor, and ferments there until the mass begins to cool off, being stirred and thoroughly mixed about three times a day, so as to have an even temperature in all parts of the fluid. It has generally finished its violent fermentation and become quiet in four to five days; it is then pressed, and the young wine run into the casks on the first floor, where it matures rapidly, and is generally ready for racking in a few weeks. The true red-wine grapes, such as Zinfandel, Burgundy, etc., are stemmed and crushed, and all put into fermenting vats in the second story. Many take the first juice from the Zinfandel and make white wine from it. This is mostly done to obtain deeper color in the red wine, but our vineyards yield color enough, and I think it deprives the wine of its best qualities, while I have never yet seen a white Zinfandel wine which I could call first class.

The whole mass is stirred and turned several times every day, and pressed as soon as the must has lost its sweetness and assumed instead the bitter taste characteristic of young red wines.

The grapes should be thoroughly ripe, but not over ripe. This is easily tested by crushing a few bunches, pressing the juice through a cloth, and testing it with the sacharometer and thermometer. The thermometer should be at sixty degrees if inserted in the must. The sacharometer mostly in use here is Balling's; twenty-five degrees of Ballings' is about equal to one hundred of Oechsle's, or one to four. Each two degrees of Balling will

be one per cent. of alcohol in fermented and clarified wine.

Here again it is absolutely necessary that you should know the material from which you make wine. The Chasselas varieties, for instance, contain but about three pro mille acid, when the must indicates twenty-five on Balling's scale, and will make a livelier wine when taken if they show but twenty-two or twenty-three, than if allowed to go up to twenty-five, or even higher. The Riesslings, Sauvignon Vert, etc., may be allowed to ripen to twenty-five, as they contain more acid, although they will also make a good wine if taken at twenty-two or twenty-three. None of our light wines ought to show higher than twenty-five, except perhaps the Zinfandel, which contains more acid than any other Vinifera I know. It must be very ripe to come up to twenty-five, and then contains four and a half to five pro mille acid. When in that stage, many of its berries are already shrivelled, as it ripens unevenly; as it colors early, many wine-makers are led into the belief that it is ripe enough, and gather it, when it should really hang a week longer. If well ripened, on good soils, it makes a very fine claret, but it is so universally grown and planted in all locations, and often handled so ignorantly, that we find a great deal more poor than good Zinfandel. But can we wonder at this, when a paper which claims to be the leading organ of the grape growers, advocates ignorance in its columns, says that chemistry and science have nothing to do with wine making, and do more harm than good ?

It is this ignorance among the great mass of our wine-makers that has been the cause, to a great extent, of so much poor and sour wine. The idea prevailed that the ripest grapes made the best wine, and few were aware of the fact that there is a limit, a time when each variety should be taken, when the sugar and acid are in the proper proportion, and that at this period fermentation

will commence quickly, and go through perfectly, if other conditions are favorable. But take the Mission or Chasselas at thirty, or even above, and then have indifferent fermenting rooms, and you cannot make a good, sound, dry wine; but, to make anything out of it, it must be fortified with brandy to make sweet wine. The great trouble in making dry wines in this State may be summed up in the following causes: Varieties of grapes which will not make fine wine; gathering and working the grapes at the wrong time; imperfect fermenting vats and rooms; negligence and slovenliness during fermentation; and improper handling afterwards.

Two of the leading grapes, those which produced most abundantly, were the Mission, originated and first distributed by the Jesuit Fathers of the Mission St. Gabriel, and the so-called Black Malvasia, and most of the older vineyards were largely composed of these. Neither is a fine wine grape; the Mission has little flavor, but developes a great deal of sugar and tannin. Its white wine will, with age, develop a certain sherry-flavor, but is harsh, heady, and heavy, affecting the nerves of those who drink it freely, and its red wine has only roughness, while it lacks flavor and that agreeable acid so essential in good claret. The Black Malvasia (so-called, though it is no Malvasia) is a large, pulpy, black grape, with a heavy bunch, and large, oblong berry. It is a good table grape. It has not color enough to be worked alone into claret or port, but the first juice is made into white wine, which is passable, but has no distinguishing qualities or fineness. The red wine is said to make about as good port, in quantity, if worked into it the first season, as has as yet been produced; but as a dry wine, though passable the first year, it developes a very disagreeable flavor with age, and contains too much acid. Most of the so-called California hocks and clarets were formerly made of these two grapes, and even the best of them

were not choice or fine wines. Their culture should therefore be entirely abandoned, except, perhaps, for liqueur wines, and even for these, I think we now have better varieties.

I have already alluded to picking each variety at its proper time. This should be done when the grape is ripe enough, but not too ripe. This time is when it contains sugar enough to make a wine varying from eleven to twelve per cent. of alcohol, or when the sacharometer indicates from twenty-two to twenty-five Balling, and from three and a half to four and a half pro mille acid. It will then make a lively and pleasant wine, agreeable to the palate, and of good bouquet, as wines deficient in acid cannot develop bouquet. This will necessitate some experimenting with the different varieties, but a little practice with the tongue will soon enable any man of ordinary intelligence to make a close guess, and the instruments will determine positively. No doubt we can also derive great benefit from blending different varieties of grapes; for instance, the Zinfandel has flavor and a sprightly acid, but is rather thin in color and taste. The Lenoir will, I think, supply both of these deficiencies, and I hope still more from Norton's Virginia and Cynthiana. Each locality will have its own special varieties in future, which it will produce in the greatest perfection, and which are suited to its soil and climate. It is generally believed that the southern part of the State will not make as good light, dry wines as the north, while it will excel in the heavy, sweet wines. While I concede the latter as the natural consequence of a longer and warmer season, which will develop more sugar and body, I am not at all sure of the former. On a recent visit to the south, I found some excellent dry wines made from the Burger and Blaue Elben, by Mr. Rose and others, and also some very fine wines made from mixed white grapes in several cellars, also very fair clar-

ets. The Burger does not ripen perfectly with us, being a tremendous bearer, and late, it makes a rather light, acid wine, of a negative character. At the south it ripens fully, and makes a fuller wine, with pronounced bouquet. Why cannot other varieties be picked and worked there when just ripe enough, and thus make good, dry, sprightly wine from them? I would not be afraid to try it, with strong hopes of entire success.

Imperfect fermenting vats and rooms are certainly the cause of a great many poor wines. I would have the fermenting vats rather wide and low than high and narrow, as they generally are here. Say five feet high and six feet wide, or still wider. They are here generally made of red wood, which makes very good fermenting vats, though I do not think it is fit for casks to keep wine in, as it is too apt to leak. A general practice here is to have false bottoms, or rather tops to the vats, perforated with holes, to hold the skins and pomace under the fluid when fermenting, and through which the fluid bubbles constantly. Experience has taught me to discard these altogether, as the mass, when thrown in, will remain cooler at the bottom than at the top, where it comes in contact with the air. The consequence is, that fermentation commences, and is more violent at the top, where it often is at nearly blood heat when it is yet cool below. My practice is, to press the pomace down frequently with wooden pestles, and mix it thoroughly with the fluid below, so as to equalize the temperature as much as possible, when I will have a thorough, steady fermentation in the whole mass. I thus avoid that unpleasant, burnt taste generally called "tank taste," which is found in so many of our clarets especially, and fermentation has never been stopped or interrupted by a slight change in the temperature, as is the case in many other establishments.

The fermenting room should be so constructed that

the temperature will not fluctuate too much. The climate in this State is peculiar, the days are sometimes very hot, while the nights are nearly always cool. Nearly all of the fermenting rooms are simply board sheds, with only one thickness of boards between the inner and outer atmosphere, so that the changes inside are almost as sudden as those outside. This should not be; if the fermenting room cannot be built of stone, it should at least have double walls of boards, with the intermediate space filled with sawdust, spent tan, or other non-conducting materials, so that it will keep as even a temperature as possible. Sudden changes interrupt fermentation, and are very injurious. Negligence and slovenliness during the whole process of wine making has a great deal to do with a poor product. Everything, from the boxes in which the grapes are picked to the cask in which the young wine is to perfect itself, should be clean; as should the crusher, press, fermenting vat, and the whole building, which should also be well ventilated, so that the air is pure. I have seen many so-called wineries, which looked more like slaughter houses than the cleanly establishments in which wine, the noblest fluid which God has given to man, is to be made and perfected. If mould and dirt are left on the fermenting vats from one year to the other, until the air is sour and fetid with the smell of decay, how can we expect wine, the most susceptible liquid that we can handle, to taste and smell fresh and pure? Before using the vats for fermenting, they should all be washed with a solution of sal soda, and the floor and press-room should be scrubbed every few days during wine making. Casks can easily be kept clean and pure by fumigating with sulphur, when empty, but before using they should be washed to free them from the taste and smell of sulphur, which also tends to prevent fermentation.

Improper handling afterwards, also has a great in-

fluence on the wine. The casks, as soon as fermentation has ceased, should be filled up to the bungs, and clean bungs driven in lightly at first, and firmly when the wine has become quite still. As soon as clear, wine should be racked into clean casks, as described in the proper place. Smaller casks are very difficult to clean, as the lees are so adhesive, yet it is important that they should be all taken out. It is best to open the cask, and brush it inside, but if a cooper is not at hand to do this, they may be cleaned by putting a small chain through the bung-hole, and then shaking the cask well, with a few buckets of clear, pure water; this should be repeated until the water runs out clear. Use as little sulphur as possible; some are in the habit of sulphuring strongly every time they rack or ship the wine. This gives an unpleasant smell and taste, and such sulphured wine is apt to cause headache. It is an old exploded idea that the lees are the mother of the wine, and that it should remain on them to gain strength. The lees are the excrements of the wine, and the sooner they are separated from it, the better. Generally the young wines are here sold to the merchant within the first six months. Of course they should be racked again before shipping, and if not sold, they should be racked again the second time in March.

I am aware that I conflict in my views on fermentation with those advanced by Mr. Arpath Haraszthy, who discourses upon fermentation at every meeting of the State Viticultural Convention, and is considered an authority on the subject. He claims that the finest white wines, such as Riessling, etc., should also be fermented on the skins, putting perforated heads on top, to keep down the skins. I do not claim to be an authority, nor do I believe in authorities. We are all seekers after truth, and each honest opinion, supported by successful practice, is entitled to respect. Practice has taught me that white wine, fermented on the skins, becomes harsh and rough, losing

all the agreeable smoothness and fineness which we admire in fine white wines, and I have never been able to find as fine wines made by Mr. Haraszthy's method, as I have seen from those who make their wines in a similar way to mine.

WINE MAKING APPARATUS.

Grapes are gathered here in boxes holding about forty pounds each, which each gatherer, when filled, carries out to the avenues between the blocks, from where they are hauled to the cellars in wagons. Boxes were formerly made very loosely, so that a great deal of juice was wasted, but they are now manufactured with bottoms of a single board, and well nailed, so that there is but little leakage. The crushers, stemmers, and presses in the smaller establishments are similar to those described in the third part of the book. The large establishments, however, use crushers and stemmers, as well as various kinds of hydraulic presses, which do an immense amount of work, with comparatively few hands, and do it in a very thorough manner. They are generally run by steam power, and will work up from eighty to one hundred tons of grapes per day, if run to their full capacity.

Cooperage of all dimensions is now made in the State, although most of the material for oak casks comes from the East in shooks and is set up by the coopers here, as California oak is too brittle and coarse-grained to work to advantage. Casks of one thousand to two thousand gallons are worth about ten cents per gallon. The casks for shipping East are generally so-called puncheons, holding about one hundred and sixty gallons, and are much cheaper, costing about three dollars and fifty cents each.

LIQUEUR WINES.

It may be expected that I should say something about liqueur wines, which form a considerable part of the pro-

duct of the State, especially of the southern portions. They may be divided into three principal classes, Port, Sherry, and Angelica. The first two have mostly been made from the Malvasia, and Mission grapes, as the latter develops a sherry flavor in its white wine when it becomes older; the last is chiefly made from Muscat of Alexandria. As I have never made them to any extent, my readers must not expect me to go into detail, for while I am willing to tell all I know, I do not like to speak about anything of which I do not know, or know at most simply from hearing. Sherries and ports, in fact, all three of these, are fortified with grape brandy, and the first two cooked or heated in separate rooms, built for the purpose. Angelica is made by adding enough grape brandy to the sweet must to arrest, or rather prevent, fermentation, and the lees and other impurities precipitated by an addition of quick lime, which clears it within forty-eight hours. Sherries are made from white wines, or rather the first run of the Mission grape, as the object here is to make a light-colored wine with a peculiar flavor and great body. Port is made from red wine, as it should contain, besides deep color, a certain sweetness and alcoholic strength, a large amount of tannin. I do not pretend to be a judge of, nor an admirer of these wines, and must leave it to others who are, to give a more full description of them and the methods by which they are made. A very learned essay by one of the first experts, Mr. Pohndorff, who has followed the business in Spain, and described the process of making and maturing natural sherries, impressed me with the idea that our American people are too impatient to wait ten years before a sherry can be fully matured and sold, and seemed to me about the strongest argument against making it here in that way, which I have ever listened to.

SPARKLING WINES.

There is at present, I believe, but one firm in the State who make sparkling wine by the old or natural process, fermenting in the bottles, and I have heard many conflicting opinions as to the success they meet with. While some think highly of the Eclipse champagne, others rate it far below the best brands of French champagnes, but I think upon the whole, it meets with very ready sale. There is a good deal of sparkling wine made in the quick or artificial way, by impregnation with carbonic acid gas, which is sold much cheaper, and, as far as I am able to judge, is a very healthy, harmless, and enlivening beverage. I do not pretend to be a nice judge of the article, but I have compared some of the "Eclipse Extra Dry" with carbonated wine, made here, and especially with some made in New York, from California wine, shipped there, and my preference was for the last; nor have I ever felt any bad effects from the use of these carbonated wines. At any rate, I think the crusade led by some persons against these carbonated wines, to petition Congress to impose a special tax on them, a very injudicious measure. If the sparkling wine manufactured by them is really so much superior to carbonated wine, it would seem to need no special legislation to foster and protect it.

THE MAKING OF BRANDY.

Brandy-making is another important branch of California grape industry. To show how important it is, I need only mention the fact that one firm made one hundred and fifteen thousand gallons of brandy last year, with four hundred and fifty thousand gallons of wine, and that all this brandy is already disposed of.

While I am no admirer of distilled liquors, and do not claim to know much about them, yet I believe, as long as they are consumed to the extent that they are in this

country, pure grape brandy would be more wholesome to use than the often poisonous and adulterated liquors now sold as whiskies and brandies. So far, most of the brandy has been distilled from the pomace and lees of wine, which, as connoisseurs say, will not make as smooth and delicate an article as that made from the wine of certain varieties of grapes, the Folle Blanche, for instance, which is the great Cognac grape of France. Yet while this may be the case, certain manufacturers have already gained a name for their brandies. Gen. Naglee at St. Jose has taken great pride in ageing his brandy, and it ranks very high. Mr. Geo. West, of Stockton, has produced a very delicately flavored and fine brandy from West's Prolific, and I suppose that this industry will perhaps progress to perfection as rapidly as the wine industry. More care in its manufacture, and better material, will bring better results as its natural consequence.

CHAPTER LVI.

EXTENT OF GRAPE GROWING IN CALIFORNIA.

The extent of grape growing in the State can hardly be estimated, as there are no official data at hand that I am aware of. The planting of new vineyards progresses at so rapid a rate that it is difficult for any one to even approximate to it. When we look at only a few of the largest plantations, we may form an idea of how rapidly these plantings are progressing.

Ex-Governor Leland Stanford, at his vineyards at Vina, found seventy-five acres in vines, planted by his predecessor, Mr. Gerke, to which were added one thousand two hundred and fifty acres of new plantations in 1882, and one thousand five hundred acres last spring, and I think

the intention is to add one thousand to one thousand two hundred acres per annum for several years to come. The Natoma Water Co., at Folsom, Sacramento County, had something like six hundred acres, mostly in table grapes, and have added one thousand two hundred acres last spring, with the intention of adding as many more next spring, for which the plants are already rooted in cutting beds. Mr. Horatio P. Livermore, the business manager, is a very intelligent and painstaking gentleman, and imported many of the choicest wine grapes of Spain and Portugal last spring, besides growing twenty thousand Lenoir for their own planting. Messrs. Stern & Rose, at San Gabriel, Los Angeles County, have seven hundred and fifty acres in vines, and made at their mammoth establishment last year, four hundred and fifty thousand gallons of wine, and one hundred and fifteen thousand gallons of brandy. The San Gabriel Wine Co., Mr. De Barth Shorb, manager, has one thousand five hundred acres of vineyards surrounding their new buildings, one of which has a capacity of one hundred and twenty-five by two hundred and sixty feet, and the other of one hundred and seventy-five by two hundred and sixteen feet, and three stories high, are capable of working up two hundred tons of grapes per day. Messrs. Kohler and Frohling, the pioneer wine makers of the State, have an immense establishment at Los Angeles, where they make mostly sweet wines and brandy, and another in Sonoma County, of one hundred and fifty acres of bearing vineyards, where mostly light wines are made, and three large cellars in San Francisco. Vineyards of from two hundred and fifty to three hundred and fifty acres are quite frequent all over the State, and Napa Valley presents, from the town of Napa up to Calistoga, a distance of about thirty miles, an area of almost continuous vineyards. These extend through the whole breadth of the valley, and far up among the slopes of the

mountains, wherever a spot could be found congenial to the vine, and not too difficult to reach. Among the leading producers in this beautiful valley are G. Groezinger, Yountville, with several hundred acres in bearing, H. W. Crabb, Oakville, three hundred and fifty acres, G. Niebaum, Rutherford, Chas. Krug, Mrs. J. C. Weinberger, Wm. Scheffler, Beringer Bros., and others. The total amount of wine made in sixty-four cellars last year in Napa County, was two million six hundred and forty-five thousand one hundred gallons. I have no data for Sonoma County for that year. Its product in 1880 was estimated by the commissioner of that district, Mr. J. de Turk, one of the heaviest producers and wine makers, at two million one hundred and eighty thousand gallons, and the number of acres of bearing vines at seven thousand, with three thousand not bearing. Mr. L. J. Rose, commissioner of the Los Angeles district, estimates the yield for the same year at three million eight hundred thousand gallons for the district, and the value of it over a million of dollars. Mr. Arpad Haraszthy, President of the Board, estimates the wine yield of the year 1880 at between ten and twelve million gallons, and its value at three million three hundred and twelve thousand five hundred dollars. Since that time, immense plantings have been made, but I can find no data upon which to base an estimate of the increased yield. As the general yield of the crop is light this year, it may be safe to estimate it at about the same as in 1880, though it should be at least one-fourth larger, were the crop the same, and should we have as abundant a crop in 1883 as in 1880, the entire production of the State would come up to twenty million gallons. It is very much to be regretted that we have no later estimates, and it would seem that, if they could be made in 1880, they could be made in the following years. Such, however, seems not to be the case, although the efforts of Mr. Gardner, editor of the

St. Helena "Star," who, with commendable enterprise, gathers a full report of the product of Napa County each year, shows how easily it might be done.

During the last few years, however, grape culture has advanced with giant strides, stimulated, no doubt, by the gratifying success and the good prices obtained for viticultural products. Here, in Napa and Sonoma counties, it would seem, indeed, as if the prices paid for grapes, for the purpose of wine making, would hardly allow a living profit to the wine makers and dealers. Last year the prices ranged from twenty-five dollars per ton, paid for Mission, to thirty-five dollars per ton for Zinfandel, Riessling, Chasselas, and other finer varieties, and this year the finer varieties seem to bring the same price, while Mission and Malvasia have gone down to twenty dollars per ton, unless extra well ripened and heavy, to fit them for ports and sherries. When we take into account that a ton of grapes generally yields about one hundred and thirty gallons, and that the young wines of last year have not generally sold at over twenty-eight cents per gallon, at an average, to the dealers in San Francisco, I, for one, can not see how the wine makers can afford present prices, and make any profit. That it is a very profitable business to the growers is apparent, if we figure up the cost of establishing a vineyard in full bearing, planted with resistant roots, to make it permanent. This may be estimated as follows:

Preparing land, plowing, harrowing, and rolling, per acre	$ 5.00
600 Riparia vines, including freight	25.00
Marking and planting	5.00
Cultivation, first year	10.00
Cultivation, second year	10.00
Grafting, including cost of cions	5.00
Staking and tieing	10.00
Cultivation and pruning, third year	20.00
Cultivation and pruning, fourth year	20.00
	$100.00

This year, the fourth, the vineyard ought to bear, say three tons to the acre; calculating at the present prices for choice grapes, this would pay for all the labor up to this time, and leave the vineyard free of debt to its proprietor, except original cost of land, and interest on capital; this can not be calculated, because land for vineyards in these counties brings all kinds of prices. Good vineyard lands in the neighborhood of St. Helena and Rutherford may now be estimated at two hundred and fifty dollars per acre, while nearly as good locations can be had, but not exactly in the "grape boom," at fifty dollars per acre. Perhaps it would be safe to average good vineyard land at one hundred dollars per acre, without improvements. Bearing vineyards, in the neighborhood of St. Helena, have been sold as high as one thousand dollars per acre, but this is, in my estimation, a fictitious value, based on the high prices for grapes now, which may not continue. In fact, I believe there will be a decline, and that very soon. But if choice wine grapes come down even to twenty dollars per ton, they would still bring a handsome profit to the grower, estimating the cost of cultivation at twenty dollars per acre, and the product at four tons to the acre.

I have given these figures mostly for my Eastern friends, who may, like myself, wish to make California their home. That they admit of very wide variations I freely acknowledge. They are based, however, upon a liberal estimate of costs, in establishing a vineyard on resistant roots, so as to be safe from phylloxera. If you want to risk the cuttings of the varieties of Vinifera, and save the expense of grafting, the whole estimate can be cut down to at least seventy dollars. But this I would consider poor policy, and I would not adopt it.

I speak with reference to but one part of the State. There are new settlements opening out every month, every year, wherever cheaper lands can be had, and where

the beginner, with limited means and a few years of hard labor, may find a home at much less cost. These, of course, are districts at present not reached by railroads, but which may be opened in a few years. If a man seeks a home which will furnish all the facilities at once, where all the industries are already established, and he has a sure market for his products every day, he has to pay for all these advantages. There are lands to be had, however, on a still different plan, which many adopt. Large landholders are parcelling out their lands in the southern part of the State; they furnish the land, while the cultivator furnishes the labor and the plants for the vineyard, works it for three years, and at the end of that time they divide, the owner taking one half of the vineyards, the other half going to the planter. I have heard of many such arrangements in the neighborhood of Anaheim, Los Angeles Co., which worked to the mutual satisfaction of both parties. It is comparatively easy there to plant and cultivate a vineyard, as the soil is sandy and very readily worked. But the land must be irrigated at least once a year, and the irrigating privileges, etc., may bring the cost to about the same as where the land is purchased. Grapes are cheaper there also, bringing only from eighteen to twenty-five dollars per ton. But the yield is also greater, being from seven to eight tons per acre. These vineyards produce at least a year earlier than those do without irrigation. In the neighborhood of Fresno, where I spent a day this fall, I have seen vineyards, planted eighteen months ago, but irrigated once a year, produce three to four tons to the acre this fall; in the third year they will produce as much as ours do here the fifth season. But still I would not like to live there, as the climate is very hot in summer, cold in winter, and is also considered unhealthy.

Grapes are generally sold to the wine makers at the above prices, who manufacture them into wines, which

are sold to the dealers in the city when they are from three to six months old. The average price paid for young wines from the cellar has been from twenty-two to thirty cents the gallon for round lots, including all in the cellar, varying somewhat with the quality and the proportion of wines of the choicest varieties. Perhaps twenty-five cents would be a fair average estimate for cellars containing one half of Mission and Malvasia. The dealers mature and blend the wines to suit their trade, and sell them, when matured, to their customers throughout the State and further East. The consumption of our wines here, especially the better claret, among those who formerly consumed imported wines altogether, is increasing very fast, as they become aware that they can obtain a better wine at less price at home than they receive from abroad; and it would increase still faster if the nefarious practice of selling honest and good California wines under foreign labels was less general. But the old saying, "far fetched and dear bought," is as true with many of our would-be aristocracy as it is anywhere; they will readily pay treble the price for an article, however inferior it may be, if it is only shipped thousands of miles, and carries a foreign label. A great many unscrupulous dealers take advantage of this tendency, and use French or Rhenish labels for California wines, thus obtaining higher prices than they would get for them under their true character, and robbing our home product of its proper appreciation.

THE FUTURE OF THE INDUSTRY IN CALIFORNIA.

Although speculations on the future are generally idle and premature, still the question, will "grape-growing pay in the future?" is ever-recurring, and I can only give surmises. I have a deep and abiding faith in the ultimate success of the industry, for the following reasons:

REESE LIBRARY OF THE UNIVERSITY CALIFORNIA.

1. We have the finest climate in the world, and can always make a good product, even in the most unfavorable seasons.

2. We have remunerative crops every year, if we avoid frosty locations, though not always equally good or abundant. Entire failures are unknown.

3. We can make good wines, and produce table grapes and raisins every year. This has been fully demonstrated by the crude beginnings of the past, which have already produced wines superior to the average of European importations, and inferior to but few.

4. We can raise grapes and make wine cheaper than any other nation or climate, for reasons given above; and if present prices drop down one-third, or even more, the producer will still make a fair profit.

5. We have the world for a market. We can satisfy every taste, as soon as our vineyards and wine-making establishments are skilfully handled. We can produce light, agreeable dry wines, red and white, as well as all the heavy ports, sherries, and sweet wines, and we can produce them at less cost than any other country, because we have no failures. All we need is, to have our product fully known and appreciated, to make it sell.

That we shall have many reverses yet, that there will be thousands who have commenced grape-growing with high hopes, and with over sanguine expectations, who will drop out of the ranks in a few years, because they lack the necessary intelligence and perseverance, I fully believe. But this is as it should be, and will be, all the world over. It is the old, old tale of the "survival of the fittest," which will repeat itself here, and in this calling, as in every other country and business; and those who persevere and are fit for the task, will reap the benefits. Poor wines will be a drug in the markets in a very few years, and none but really good wines will find a ready sale.

Let it be so; we can spare the poor wines, and those who make them; their loss will be our gain.

GENERAL REMARKS.

I have come to the end of my task. That it can, at the best, be but imperfectly performed, treating of such an industry in a necessarily condensed form, no one knows better than myself. We have an immense field before us, where there is yet room for millions of willing and intelligent heads and hands. With the high price of labor now paid (one dollar per day and board is about the average), thousands of intelligent, industrious laborers can find lucrative employment, and no one who is sober and industrious need fear but he can make a living here. The many vineyards planted by capitalists as a good investment of their money, when they come into bearing, will need the supervision of skilful men, and there will be in a few years a great field for intelligent men, more so even than there is now, and all such should be welcomed as desirable acquisitions. We have a State Board of Viticulture, created by act of Legislature, with an appropriation of ten thousand dollars, annually, who have already collected and distributed much valuable information, held two annual conventions of grape growers, and exhibitions of viticultural products, and who could accomplish still more good, did its presiding officers freely tolerate different views from their own and encourage the full and free expression of the opinions and experience of all practical men.

The Agricultural Department of our State University, under the able management of Prof. Hilgard, has already rendered efficient aid, by analyses of soil, experiments in fermentation, researches in regard to Phylloxera, and resistant stocks, lectures and reports, etc., and could do still more, were its means sufficient to do all the faculty would like to accomplish.

In conclusion, I wish to tender acknowledgments for the information gained from the reports of our State Viticultural Commission, the pamphlets issued by the State University, and to the press throughout the State. Also I would return my grateful thanks for the kindness and courtesy shown me by my brother grape growers throughout the State, who have welcomed the stranger in their midst, and freely imparted the knowledge and experience gathered through long years of arduous labors; especially the Messrs. Crabb, Groezinger, Krug, Weinberger, and others in Napa Valley; to Messrs. Dresel, Gundlach, Winkel, Hill, and others of Sonoma; to Messrs. West, of Stockton; Mr. Blowers, of Woodland; Mr. Lefranc, of San Jose; Messrs. Kohler, Bundscheu, Lachman, Schilling, and others, of San Francisco, for much of the information contained in these pages. My effort is somewhat desultory, and must needs be, with so vast a task before me. If it serves but to give a little more insight, and impart some useful knowledge to new beginners, I shall have accomplished my object.

INDEX.

Acidimeter, Twitchell's.....201-217
Æstivalis Class..... 54
Arbors, Vines Upon..... 93
Barney, Hon. Hiram.....185
Baskets for Packing..... 122
Bateham, M. B., Grapes and Wine in Ohio.....135
Birds in the Vineyard..... 114
Border of Vines..... 109
Bottling Wine.....211
Burr's, John, Seedlings.....191
California, Grape Culture in Fresno Co..... 162
" Grape Culture in Napa Co.....166
" Grape Culture in Sonoma Co 169
" Phylloxera Problem in..186
Cambre, Eugene, on Grafting. 25
Campbell, Geo. W., Grape Culture in Southern Ohio.....127
Carrying Vat.....203
Cashin, T. D., Grape Culture in Maryland..... 174
Cashin's Trellis..... 176
Casks..... 199
" Preparing.....206
Catawba Must Gallized.....227
Cellar Furniture.....198
Classes of Grapes, Æstivalis..... 54
" " " Cordifolia..... 55
" " " Labrusca..... 35
" " " Riparia..... 65
Colonies for Grape Growing.....238
Cordifolia Class 65
Cornelius, Mr., Method of Grafting. 25
Cost of Establishing a Vineyard...191
Crabb, H. W., Viticulture in Napa Co., Cal..... 169
Crooked Lake, N. Y., Grapes .123-142
Cultivation of Vineyard..... 87
Cuttings, Grafted. .....,..... 26
Discarded Labrusca Varieties..... 53
" Æstivalis Varieties..... 65
Diseases of the Vine..... 402
" " " "Greeley Rot".140
" " " Mildew on Kelley's Island..140
" of Wine.....211
Drainage on Kelley's Island.....138
Draining the Soil..... .. 31
Dresel, Julius, Viticulture in Sonoma Valley, Cal.....166
Egg Harbor, N. J., Wines.....190
Eckel, Rudolph, Grape Growing in W. Texas.....159
Eisen, Gustaf, Culture of the Grape in California..... 162
Engelmann, Dr., on Native Grapes 13
Fermentation.....205
" Changes Caused by.222
" the Second.....210
Fermenting on the Husks... 207
Frosts, Protection from.....115
Fruit, Thinning.....95-118
Funnel for Wine.....200
Gall, Dr., On Wine Making.. 218
Gallizing 214
"Gallonizing" 214
Gathering and Marketing Fruit....121
" Grapes for Wine....124-202
Girdling the Vine..... 117
Golden Willow for Tying.. 91
Grafting, Advantages of..... 22
" Methods..... 23
" Upon Cuttings..... 26
Grape and Fruit Colonies.....236
" Cholera 104
Grape Culture in California.162-166-169
" and Wine Making on Crooked Lake, N.Y.142
" In Maryland.....174
" In Missouri.....180
" In Southern Ohio.....127
" In Southern Texas...145
" In Tennessee.....182
" In Western Texas,...159
" On Kelley's Island, O.138
Grapes, Classification of.. 11
" European..... 12
" Natives Species of.....12-151
" Scissors 120
" Time to Gather for Wine..202
" What to Plant..... 31
" When Ripe. 121
Grape-Sugar.....233
Gray Rot..... ..194
Horizontal Arm Training.....93-101

House Cellar for Wine..... 195
Husks and Lees—Uses for..... 212
Hybrids of Labrusca..... 35
Inarching the Vine..... 24
Insects, Injurious to the Grape....105
" Aphis.....112
" Beetles.....111
" Bees.....113
" Camel Cricket 113
" Cut-worm..... 111
" Devil's Horse.....113
" Grape-Vine Fidia.....112
" Grape-Vine Root Louse....105
" Grape-Vine Sphinx.....112
" Grasshopper.....112
" Lady Bug.....113
" Leaf-Folders... 93-111
" Mantis 113
" Phylloxera 105
" Plant Louse. 112
" Rear-Horse.....113
" Rocky Mountain Locust...112
" Root-Louse of the Grape..105
" Thrips..... 112
" Useful..... 113
" Wasps.....113
Iowa—White Elk Vineyards.....184
Jaeger's, Hermann, Seedlings..... 64
Keeping Grapes..... 122
Kelley's Island, O., Grape Culture on.138
Keuka Lake, N. Y., Grapes at.....142
Labrusca Class... 85
Langendoerfer's, F., Seedlings 62
Laterals, Treatment of..... 93
Layering to Fill Vacancies..... 97
Leaves, Removal of 118
Location and Soil for Vineyard..... 28
Madinger's, Jacob, Seedlings..... 53
Manuring the Vine..... 97
Maryland, Grape Culture in 174
Mildew 103
Miller, Sam., on Early Winter.....191
Mill For Grapes 199
Missouri, Grape Culture in 180
Muench, Hon. F., on Grape Culture in Missouri..... 180
Must, Its Change Into Wine..... 219
" Normal 215-223
" of American Grapes..... 224
Must-Scale... 200-216
Oechsles' Must Scale... 200-216
Ohio, Grape Culture and Wine-Making in ... .135
Ohio, Southern, Grape Culture in..127
Old Vines, Renewal of.....119
Onderdonk, G., on Grape Growing in Southern Texas 145
" on The Grapes of Texas.....151
" Memoranda on Grape.153
" on The Vineyard in Texas.....154
Packages for Marketing.....122
Phylloxera Problem in California...186
Pinching the Laterals..... 93
" Young Shoots 92
Planchon, Prof., on Phylloxera.....106
Planting the Vine 81
Pleasant Valley Wine Co... 143
Poeschel & Scherer, Success in Grafting 23
Press for Grapes..... 198
Propagation, by Cuttings 19
" by Grafting 22
" by Inarching..... 24
" by Layers 21
" by Seeds..... 16
Protection in Winter..... ..115
Pruning and Training..... 87
Pruning Saw..... 120
Pruning Shears.....119
Racking the Wine.....208
Raisins in California.....172
Riparia Class. 65
Ripeness, How Known 121
Ripening, To Hasten.....117
Ricketts', J. H., His Seedlings..... 51
Riley, Prof. C.V., on Phylloxera.105-107
Rommell's, Jacob, Seedlings 65-70
Rulander Wine, Experiments With.226
Saccharometer..... 200-216
Seedling Vines..... 17
Seeds, Sowing..... 17
Soil and Location for Vineyard..... 28
Soil, Preparation of.... 30
Spotted or Brown Rot..... ..104
Sugar Used in Wine Making 233
Tennessee, Grape Culture Near Chattanooga 189
Texas, Grape Growing in Southern.145
" " " in Western..159
" Native Grapes of.....151
Thinning the Fruit.... 95-113
Training as Border..... 100
" Horizontal Arm.....101
" " Spiral 173

Training Horizontal Zig Zag.... ..175
" in Stool Form... 99
" in Western N. Y.....100
" on Arbors and Walls..... 98
" to Stakes..... 99
Trellis, Cashin's ... .176
" To Build..... 85
Tubs in Wine Making.....200
Tying Material 91
Urbana Wine Co.... 142
Vacancies, To Fill 97
Vallet's, Jno., Method of Grafting 24
Vat for Carrying Grapes..... ...208
Vats for Fermenting..... .. 199

VARIETIES OF GRAPES—Synonyms in *Italics.*

Alvey 63
Amber..... 70
Aminia 43
Ariadne..... 75
Bacchus..... 74
Baldwin Lenoir..... 63
Barry 43
Beauty 44
Black Defiance.....44-133
Black Eagle..... 44-133
Black July.....63-146
Black July (Berckmans')..... 154
Black Spanish.....61-145-161
Black Spanish in Texas. 159
Bloomsburg 77
Brighton..... 46
Brighton in Ohio..... 130
Bullace..... 15
Bush 151
Catawba 35
Catawissa Bloom..... 77
Christine 43
Clinton 76
Columbia County..... 77
Concord..... 35
Concord in Ohio 128
Cottage 53
Creveling 77
Cunningham 61
Cunningham (Berckmans')..... 153
Cynthiana..... . 54
Delaware..... 77
Delaware in Ohio.....131
Devereux..... 61
Duchess..... 47
Dunn 153
Early Champion..... 44
Early Dawn..... 46
Early Winter..... ..191
Elvira..... 66
Elvira in Ohio..... 131
Essex 36
Eva... 45
Far West.. 64
Frost 14
German Grape 77
Gœthe 36
Golden Delaware..... .175
Hagar..... 63
Harwood.....153-157
Heath 77
Herbemont..... 58
Herbemont in Texas.. 157
Herbemont's Madeira. 58
Hermann 62
Highland..... 51
Italian Wine.... 77
Ives 39
Jack 61
Jacques 61
Jefferson 51-133
Lady..... 45
Lady in Ohio.....129
Lady Washington..... 51-133
Laura Beverly..... 77
Lenoir.... 61-145
Lenoir (Berckmans')..... 154
Lincoln..... 63
Lindley.... 39
Long..... 61
Mabel..... 134
Martha... 39
Massasoit..... 39
Missouri Riesling 74
Moore's Early..... 46
Moore's Early in Ohio.....130
Muscadine..... 15
Mustang..... 151
Naomi..... 75
Neosho..... 63-65
Niagara.... 46-132
Noah..... 74
Northern Fox..... 13
Norton's Seedling 57
Norton's Virginia..... 57
Pearl 73
Perkins..... 40
Pizarro 74
Planet..... 52

Pocklington 47-132
Prentiss 48-133
" Seedling No. 1 51
" " No. 2 51
Purity 78-130
Racine 65
Red River 54
Ricketts' No. 1 52
" No. 11 52
" No. 502 52
" No. 250 52
" No. 331 52
" No. 231 75
" No. 234 75
" No. 413 75
Riverside 14
Rogers' Hybrids No. 1 36
" " No. 4 43
" " No. 7 39
" " No. 39 43
" " No. 41 36
" " No. 43 43
Rommell's No. 14 73
" No 20 73
Rulander 62
Salem 40
Scuppernong 78
Southern Æstivalis 152
Southern Fox 15
Storm King 53
Summer 13
Taylor 76
Telegraph 43
Traminer 77
Transparent 70
Triumph 45
Uhland 73
Virginia Seedling 57
Warren 58
Warren in Texas 157
Warrenton 58
White Norton, Balsiger's 65
White Norton, Langendoerfer's 65
Wilder 43
Willis 134
Winter 14
Worden's Seedling 130
Varieties, Choice of 31
" Difficult to Classify 77
" for Different Localities. 79 80
Vine, Diseases of 102
Vines to Plant 81
" Treatment the First Summer. 84
" " " Second " 87
" " " Third " 91
" " " Fourth " 96
Vineyard, Cost of 191
" Cultivation 87
" in Texas 154
" Location and Soil 28
Vitis æstivalis 13
" candicans 151
" cordifolia 14
" Labrusca 13
" riparia 14
" rupestris 151-160
" vinifera 12
" vulpina 15-78
White Elk Vineyards 184
Wine, After Treatment 210
" Bottling 211
" Cellar 195
" " Substitute for 198
" Diseases of 211
" Flat and Turbid 211
" Making 195
" " Gall's and Petiol's Method 213
" " on Crooked Lake 143
" " Made Easy 236
" at Egg Harbor, N. J 190
" Dry 232
" Sweet 222
" White or Red 205
Winter Protection 115
Wires for Trellis 85

CONTENTS OF THE ADDED CHAPTERS.

American Vines in France 270
Diseases and Insects 267
Frosts 277
Grafting the Vines 262
Extent of Grape Growing in Cal 296
Marketing Grapes 278
Nursery, The 244
Raisin Making 279
Stocks, Species for 240
" Propagation of 242
Training the Vines 264
Vineyard, The 244
" Cultivation of 258
" Preparation of Ground 245
" Restoring an Infested 275
" Selection of Varieties for 247
Wine Making in California 284
" " Apparatus for 293
Wines, Liqueur 293
" Sparkling 296

Gardening for Young and Old.

THE

CULTIVATION OF GARDEN VEGETABLES IN THE FARM GARDEN.

By JOSEPH HARRIS, M.S.,

Author of "Walks and Talks on the Farm," "Harris on the Pig," "Talks on Manures," etc

CONTENTS.

Introduction.—An Old and a New Garden.—Gardening for Boys.—How to Begin.—Preparing the Soil.—Killing the Weeds.—About High Farming.—Competition in Crops.—The Manure Question.—The Implements Needed.—Starting Plants in the House or in the Hot-bed.—The Window-box.—Making the Hot bed.—Cold Frames.—Insects.—The Use of Poisons.—The Care of Poisons.—The Cultivation of Vegetables in the Farm Garden.—The Cultivation of Flowers.

ILLUSTRATED.

12mo. Cloth. Price, post-paid, $1.25.

ORANGE JUDD COMPANY, 751 Broadway, New York.

The American Agriculturist

FOR THE

Farm, Garden, and Household.

Established in 1842.

The Best and Cheapest Agricultural Journal in the World.

TERMS, which include postage *pre-paid* by the Publishers: $1.50 per annum, in advance; 3 copies for $4; 4 copies for $5; 5 copies for $6; 6 copies for $7; 7 copies for $8; 10 or more copies, only $1 each. Single Numbers, 15 cents.

AMERIKANISCHER AGRICULTURIST.

The only purely Agricultural German paper in the United States, and the best in the world. It contains all of the principal matter of the English Edition, together with special departments for German cultivators, prepared by writers trained for the work. Terms same as for the "American Agriculturist."

BOOKS FOR FARMERS AND OTHERS.

Send ten cents for our new handsomely illustrated and descriptive Catalogue of Books on all branches of Agriculture, Horticulture, Architecture, etc. All books comprised in this Catalogue will be mailed pre-paid on receipt of the price named. Our abridged descriptive Catalogue of Books will be sent free on application.

Books on Out-Door Sports and Pastimes.

Send five cents for our new and elegantly gotten up SPORTSMAN'S COMPANION, containing brief descriptions or outlines of nearly one hundred and eighty works upon legitimate Out-door Sports and Amusements, and illustrated with a great number of engravings, many of them drawn from life, and faithfully portraying the points and characteristics of game, birds, fishes, horses, dogs, etc., etc.

ORANGE JUDD COMPANY, 751 Broadway, New York.